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# Dynamic Managerial Capabilities in New Ventures

# An empirical analysis

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*A Miguel y a mi madre*

***Caminante, son tus huellas***
***el camino y nada más;***
***caminante, no hay camino,***
***se hace camino al andar.***

***Al andar se hace camino***
***y al volver la vista atrás***
***se ve la senda que nunca***
***se ha de volver a pisar.***

***Caminante no hay camino,***
***sino estelas en la mar.***

**Antonio Machado**

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# CHAPTER 1: Introduction

## 1.1 Introduction

The success and growth of New Ventures (NVs) plays a major role in our economies as they are the principal generators of new jobs (Birch, 1979)and the development of technological leadership (Zahra and Wright, 2015). For these reasons, the study of NVs' performance has received wide research attention over the past decades (Birley, 1987; McDougall, Robinson, and DeNisi, 1992; Zahra, Sapienza, and Davidsson, 2006). Scholars who promote the Resource-Based View (RBV) of the firm have worked on the assumption that sustained competitive advantage derives from the resources and capabilities controlled by a firm that are valuable, rare, imperfectly imitable, and not substitutable (Barney, 1991; Grant, 1991). Proponents of the dynamic capabilities approach have gone a step further by extending the RBV to dynamic markets, stating that performance differentials are sustained by the capabilities by which firm managers integrate, build, and reconfigure internal and external competencies (Teece, Pisano, and Shuen, 1997).

In the particular context of NVs, founding teams and managers have emerged as the key resource in pushing the venture forward within the competing space (Klotz, Hmieleski, Bradley, and Busenitz, 2014; Chahine, Filatotchev, and Zahra, 2011), as the routines and systems that lay the ground for the effective development of ordinary and dynamic organizational capabilities (Winter, 2000) are unlikely to be fully developed (Helfat and Lieberman, 2002). Indeed, advocates of the Upper Echelon Theory (UE) have provided evidence that executive cognitions, values, and perceptions have an influence on the process of strategic choice and the resultant performance outcomes (Hambrick and Mason, 1984). However, the arguments of this theory have been rarely applied in the context of NVs. Even rarer are the cases where the top management teams (TMT) and boards of these companies are considered beyond the founder's socio-demographic and psychological profile (Rechner and Dalton, 1991; Westphal, 1999; Yang, Zimmerman, and Jiang, 2011).

In this direction, the Dynamic Managerial Capabilities (DMCs) of NVs' founders and managers deserve special attention when trying to explain performance variations across new ventures. DMCs are the capabilities with which managers create, extend, and modify the ways in which firms make a living (Adner and Helfat, 2003). They draw on a set of underlying managerial resources, namely, managerial human capital, managerial social capital and managerial cognition, which provide the basis for the patterned aspects of managerial intentionality, deliberation, decision making, and

action (Martin, 2011). DMCs constitute a "unique core" to the resource bundle of the firm, which then drives the creation, extension, and modification of the firm's resource portfolio, constituting the basis for why firms differ in their strategies and performance (Kor and Mesko, 2013; Townsend and Busenitz, 2014).

Despite the importance of DMCs for a NV's ability to achieve congruence between its competencies and changing environmental conditions, we know little about DMCs in NVs. The literature needs to determine which the specific attributes of DMCs in NVs are and how differently these attributes contribute to NVs performance during the early stages of the venture. Moreover, DMCs are expected to be crucial under conditions of change, yet we do not know how variations in the level of change experimented in the firm environment affect the role played by the three DMCs dimensions for NV performance. The literature needs to understand if all three DMCs dimensions are universally relevant for performance or their effects are contingent to the level of environmental change.

## 1.2 Research questions

In this dissertation, we would like to contribute to our knowledge about the capabilities of NVs, by analyzing a specific capability: DMCs. In so doing, we assume that certain number of organizational capabilities emerge from the characteristics of the executives themselves rather than from organizational routines and procedures (Teece, 2012). This assumption is especially important in the context of NVs. NVs limited organizational experience makes capabilities residing in the managers to gain relevance when explaining heterogeneity in performance.

The research gaps we identify in our literature review lead to two main overarching sets of questions. The first set of questions is related to providing a framework for measuring DMCs in the context of NVs. In spite of being a widely studiedd concept, no study to our knowledge offers a framework with which to measure DMCs that takes into accountt its three dimensions in combination. Most existing studies are theoretical articles that try to foster the concept of DMCs or use the concept in an implicit way (to explain other phenomena). Most importantly, very little is known about the measurement of DMCs in the particular context of NVs (Townsend and Busenitz, 2014). As companies evolve in their lifecycle the challenges and opportunities they face vary significantly, signaling the possibility that different team characteristics may be

more or less important at various phases in the development of NVs (Brixy, Sternberg, and Stüber, 2012). Surprisingly, current research lacks longitudinal studies that examine the characteristics of NV managerial teams across different stages of the entrepreneurial process (Klotz, Hmieleski, Bradley, and Busenitz, 2014).

The second set of questions relates to the deployment of DMCs in NVs. How could DMCs' underpinnings help to improve NVs' performance? Are all of their underpinnings equally importantt? What roles do the features of the team, the firm itself, and ultimately the degree of change in the environment play in the relationship between DMCs' underpinnings and NV performance? All three DMCs underpinnings -- managerial human capital, managerial social capital and managerial cognition-- develop through managers prior experiences (Helfat and Martin, 2015); therefore, the same experience may contribute simultaneously to the three attributes of DMCs (Beck and Wiersema, 2013). Measuring all three DMCs dimensions and exploring empirically the relationships between them as we do in this study is hence important in order to not incur in errors and misinterpretations in their assessment.

### 1.3 Objectives

The overall objective of this dissertation is the study of DMCs in NVs. More specifically, this study aims to understand the deployment of DMCs in NVs, its implications for performance, and the contingencies exerted by the degree of environmental change.

We begin by offering a framework for measuring DMCs. This framework allows us to explore how these capabilities impact NVs' performance by assessing the relative importance of the three distinct underpinnings of DMCs --managerial human capital, managerial social capital and managerial cognition-- during the early years of activity of entrepreneurial ventures. Importantly, we seek to understand the role that the features of the team, the firm and ultimately the environment play in the relationship between DMCs' underpinnings and NV performance.

The dissertation seeks to make several contributions to the literature on NVs as well as to the literature on DMCs. Overall; we move the body of literature on DMCs from its original theoretical conceptualization into its actual empirical measurement and assessment. We provide a broad perspective on how DMCs are configured in the early

stages of NVs' development. Our empirical study reveals that not all DMCs' dimensions --managerial human capital, social capital, and cognition-- have the same impact on performance during the early years of a venture's activity. Also, some of these dimensions may prove to be universally relevant, whereas the effect of others may be contingent to the level of environmental change.

## 1.4 Scope of the dissertation

### 1.4.1 Theoretical scope

This dissertation falls within two fields of research: strategic management and entrepreneurship research. Within the strategic management research this study essentially relates to one of the fundamental questions of this area of research: why firms are different and perform differently? (Porter, 1991; Rumelt, Schendel & Teece, 1991). In so doing we rely on the major predominant perspectives in organization and strategic management on the sources of organizational differences when referring to internal factors in the search of these explanations: the resource based view (Amit & Schoemaker, 1993; Barney, 1991; Peteraf, 1993) and the dynamic capabilities approach (Winter, 2003). We particularly focus on the founders and managers as the key firm *internal* element explaining performance variations across NVs exploring DMCs, the capabilities with which managers build, integrate, and reconfigure organizational resources and competences (Adner and Helfat, 2003) for achieving dynamic fit under changing conditions (Peteraf and Reed, 2007). The role of the executives is key in order to develop dynamic capabilities (Teece, 2014). Thus, NVs became an optimal setting to analyze these capabilities, particularly DMCs.

Within the field of entrepreneurship research this dissertation relates to the set of individuals who discover, evaluate and exploit entrepreneurial opportunities (Shane and Venkataraman, 2000). Within the entrepreneurship literature there exists a broad consensus in that the team that pursues a particular opportunity is the key explanatory factor of the success of the venture (Klotz, Hmieleski, Bradley, and Busenitz, 2014). The concept of DMCs helps to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance (Helfat and Martin, 2015).

The link between the two fields of research is based on the need to understand how entrepreneurs develop capabilities related to entrepreneurial, managerial, and technical functional roles, who could assist them in recognizing and exploiting opportunities and ultimately achieving superior performance (Penrose, 1959).

### 1.4.2. Empirical scope

The empirical study of the dissertation focuses on new ventures, firms in their early 6 to 10 years of existence (McDougall, Robinson, and DeNisi, 1992), that operate in knowledge-intensive service industries that entered the Alternative Investment Market of the London Stock Exchange (AIM) during their first two years of existence for the period 2004 to 2010. These are a total of 126 NVs that were tracked from 4 to 10 years after their register. These are ambitious new ventures that have achieve certain degree of consolidation as they have managed to go public almost from inception and have at least overcome the barrier of the first 4 years of activity. Our sample consists mostly on British NVs, although most of them operate globally. In spite of only considering service firms, our sample is multi-sectorial and the activities developed are diverse: information and communication, financial and insurance activities, administrative and support service activities, among others. However, most of the companies are involved in professional, scientific and technical activities.

These particular ventures represent an especially relevant setting for answering our research questions for several reasons. First, new ventures that intend and manage to go public soon after inception are managed by ambitious teams that exert a strong influence on the endeavors of the firm. Second, services have a number of characteristics that make them not very visible to the consuming public (i.e. being non-standardized intangibles; being labour intensive; and requiring high customer participation), a fact that strengthens the important role that managers have to play in order to reduce the ambiguity around their services while trying to bring them to the market. Finally, the various service industries under study (i.e. information and communication; professional, technical and scientific activities; and financial and insurance activities differ in their levels of change and dynamism). The level of environmental change is meant to affect the type of experience and the required abilities of management teams.

## 1.5 Research methods

The conceptual framework and hypotheses of the dissertation are developed based on extant literature. Our literature review departs from Helfat and Martin's (2015) recent paper about DMCs. The literature review allowed us to determine what is currently known about DMCs in the context of NVs. Importantly, the literature review signaled a lack of studies measuring DMCs' three underpinnings in combination, a finding that led us to undertake a second literature review to explore empirical studies that explained independently a single DMC underpinning –managerial human capital, social capital or cognition–. This review helped us to identify the key characteristics of managers that should be considering when trying providing a framework for measuring DMCs.

Departing from the literature review we gathered fine grained information about the backgrounds and experiences of all ventures' TMT members for the period under study. The longitudinal data on managers were gathered from the various sources of secondary data: firm's annual reports' and completed by information from Amadeus, LexisNexis, professional social networks such as LinkedIn, and economic webpages such as Bloomberg and Zoom Info. Data at the firm level, such as performance, size, ownership, among others and data at the industry level, such environmental dynamism were compiled from Amadeus.

The empirical study is longitudinal in nature. That is, data is collected at different points in time: yearly observation for a period ranging from 4 to 10 years. The quantitative approach makes it possible to empirically test hypotheses derived from extant theoretical and qualitative work, and it allows for the simultaneous inclusion of elements derived from different theoretical approaches. With this quantitative approach, this dissertation aims at consolidating and expanding the existing knowledge on the fields of strategic management and entrepreneurship and subjecting them to rigorous testing.

In this study, factor analysis and dynamic panel regression analysis, among other multivariate techniques, are employed to test whether the hypothesized relationships between the constructs hold in the data. The reliability, validity, and limitations of the study are carefully assessed.

### 1.6 Overall research design and reading guide

The dissertation is structured as shown in Figure 1.1. In the first chapter, we set forth the broad research problem and the specific questions that will be examined in this dissertation, and identify the objectives, research questions and research methods of the study.

In Chapter 2, we summarize the state of the art of the research on DMCs in general and in the context of NVs in particular and identify current research gaps in the literature on DMCs.

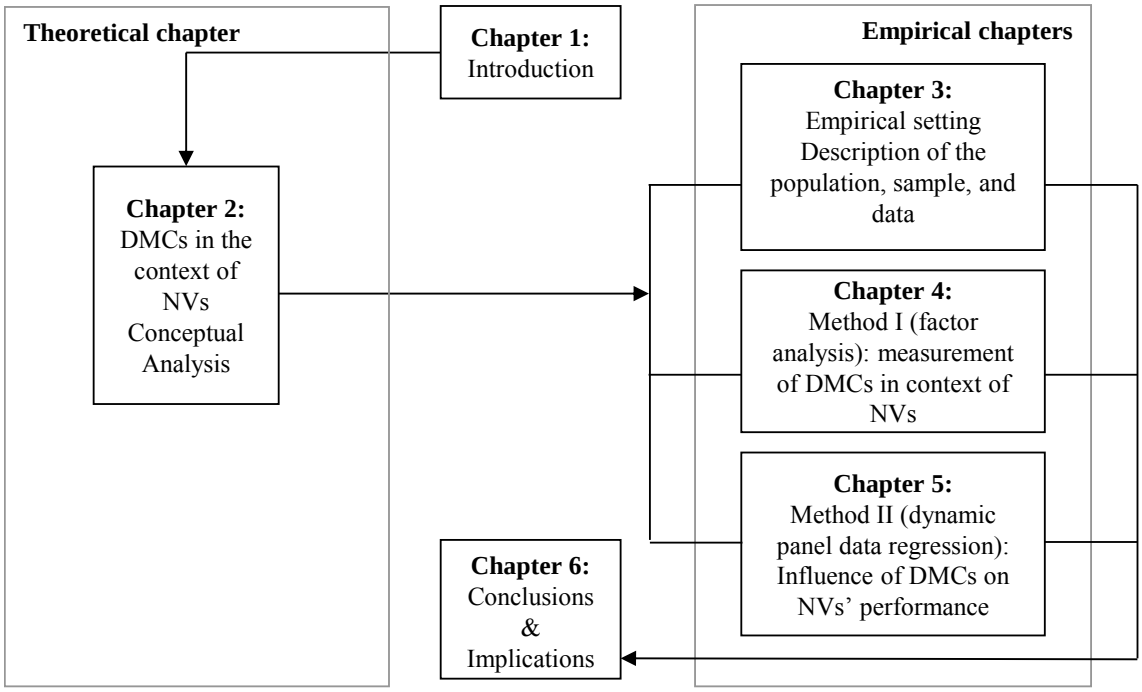
In Chapter 3, we describe the empirical setting of the dissertation: the population and sample. We provide a detailed description of the variety of NVs and industries under study. We offer descriptive statistics on the main variables used in the dissertation.

In Chapter 4, we describe the process followed to provide a framework for measuring DMCs. We provide details about the selection and justification of the variables used for measuring DMCs' underpinnings, and report the factor analysis by which we identify the key factors underlying NVs' DMCs.

In Chapter 5, we present and empirically test the research model of the dissertation, in which we explore the influence of DMCs' underpinning on performance and the contingency effects of the degree of environmental velocity. The models are tested using panel data analyses controlling for variables at different levels: TMT, board, firm and industry. Interesting significant results are obtained.

Finally, in Chapter 6 we present the key findings of the dissertation, recognize the overall limitations of the study, and identify the managerial implications and potential future research avenues.

**Figure 1.1. Basic research design and layout of the dissertation**



# CHAPTER 2: DMCs in the context of new ventures

## 2.1 Introduction

New ventures are the drivers of economic growth, contributing to the commercialization of new products and services, and the creation of employment (Birch, 1979; Birley, 1987). Despite some of them being highly successful and achieve high growth rates during their early years of existence, their prospects of survival are limited. New ventures face the challenge of competing with established firms while at the same time suffering the liabilities of newness (Stinchcombe, 1963). New venture founding teams emerge as the key resource to push the venture forward in the competing space (Nelson, 2003; Klotz, Hmieleski, Bradley, and Busenitz, 2014). In particular, the dynamic managerial capabilities of venture founding teams could explain their ability to adapt to their environment and might ultimately be responsible for their early success.

In this literature review we define and analyze existing research on the key concept of the dissertation, which is dynamic managerial capabilities. The original concept of dynamic managerial capabilities arises from the seminal paper of Adner and Helfat (2003). The basis of the definition lies in the concept of dynamic capabilities (Teece, 2007) and the application of how some CEOs may have dynamic capabilities that can aid strategic change (Rosenbloom, 2000). The concept of DMCs is an analogy to more general dynamic organizational capabilities defined as capabilities that enable an organization to integrate, build and reconfigure competences (Teece, Pisano, and Shuen, 1997), but transferred from the organizational to the managerial level. The concept of dynamic managerial capabilities helps to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance.

However, in spite of their importance, little is known about how DMCs are configured in the context of NVs. As is well known, organizational capabilities arise from routines and procedures (Nelson and Winter, 1982), and hence established companies draw on their experience to generate organizational capabilities. Consequently, NVs' (those companies that are in their early years of activity) lack of organizational experience explains the existence of different drivers of dynamic capabilities (Zahra, Sapienza, and Davidsson, 2006). The prior experience embedded in the venture founding team rather than in the firm itself could be especially relevant for building dynamic capabilities in NVs. Furthermore, this scarcity of organizational

capabilities means that the capabilities residing in the managers take on additional relevance in explaining heterogeneity in performance.

This research gap leads to two overarching questions. The first question is related to the measurement of DMCs in NVs context. In spite of being a concept broadly studied, few studies offer a measurement of DMCs. Most of them are involve on theoretical research or using the concept in an implicit way (to explain other effect). Even less is known about the measurement of DMCs in NVs. (Townsend and Busenitz, 2014) The second question is related to the deployment of DMCs in NVs. How would these capabilities help to improve an NV's performance? Are all of their underpinnings equally important? What role do the features of the founding team, of the firm and ultimately of the environment play in this relationship?

This chapter seeks to offer the foundations for answering these two broad questions in the subsequent chapters of the dissertation. To this end, it provides a comprehensive literature review of the DMCs topic, summarizing what is currently known and what remains still unknown about DMCs.

To facilitate understanding, the chapter is structured as follows. We begin by reflecting about the building blocks of the notion of DMCs: both dynamic and managerial capabilities. Subsequently, we discuss the concept of DMCs, their underpinnings and the links among them. In the following section, we conduct a literature review, and the evolution of the concept of DMCs is analyzed.

In addition, we deepen our understanding of how DMCs have been measured until now, and which variables have been used to explain each underpinning: human capital, social capital and cognition, in the context of NVs. The chapter concludes discussing what is currently known about DMCs and identifying research gaps for future avenues.

## 2.2 Theoretical discussion

### 2.2.1 Managerial capabilities: What are they?

The persistence of existing capabilities depends on the strength of the perceived need to change, the impetus for change, and the managerial capacity to integrate and recombine resources as desired (Penrose, 1959).

The role of the TMT as a key resource in obtaining a sustained, competitive advantage for the firm is not a new issue in our discipline (Penrose, 1959; Hambrick

and Mason, 1984; Castanias and Helfat, 1991; Grant, 1991; Barney, 1991; Castanias and Helfat, 2001).

For instance, upper echelon theory (UE) is a theoretical framework used to predict that organizations will be a reflection of their top management teams (Hambrick and Mason, 1984). UE perspective centres on executive cognition, values and perceptions, and their influence on the process of strategic choice and the resultant performance outcomes. Because executive cognitions, values and perceptions are difficult to measure, the UE perspective invokes prior research on demography to suggest that managerial characteristics are reasonable proxies for underlying differences in cognitions, values, and perceptions (Carpenter, Geletkanycz, and Sanders, 2004). Upper echelon characteristics such as age, functional background, and educational experiences are next taken as observable proxies for the psychological constructs that shape the founding team's interpretation of the internal and external situation, and facilitate the formulation of appropriate strategic alternatives (Finkelstein and Hambrick, 1996).

By other side, from a resource-based point of view (RBV), sustained competitive advantage is derived from those resources and capabilities controlled by a firm that are valuable, rare, imperfectly imitable, and not substitutable (Barney, 1991; Grant, 1991). These resources and capabilities can be viewed as mixed bundles of both tangible and intangible assets, including a firm's management skills, its organizational processes and routines, and the information and knowledge it controls (Barney, Wright, and Ketchen, 2001).

Managerial resources, defined as the skills and abilities of managers combined with other companies assets and capabilities jointly, are key contributors to the entire bundle of company resources that enable some firms to generate rents (Castanias and Helfat, 2001).

The type and quality of managerial resources have important empirical implications for firm performance, the selection and training of CEOs and other managers, managerial compensation, and corporate governance (Castanias and Helfat, 2001).

However, although managerial resources are relevant, scarce, imperfectly imitable, imperfectly substitutable, and have the potential to generate rents, this can only occur if these managerial resources are utilized well (Castanias and Helfat, 2001). In this case

we will be talking about managerial capabilities, which are related to the ability to manage and organize people and resources (Ucbasaran, Westhead, and Wright, 2008)

Both UE and RBV provide a useful lens through which to investigate the effect of new venture teams (NVTs) on firm performance (Klotz, Hmieleski, Bradley, and Busenitz, 2014). NVT research has examined the initial inputs of such teams, including prior experience (Nelson, 2003; Amason, Shrader, and Tompson, 2006; Beckman, 2006), social capital (Baron, 2006; Brinckmann and Hoegl, 2011; Zolin, Kuckertz, and Kautonen, 2011), and personality and general mental ability (Laamanen and Wallin, 2009; Baum and Bird, 2010), and it has attempted to identify the essential ingredients for building effective NVTs.

### 2.2.2 Dynamic capabilities: What are they?

In the early 2000s, scholars extended the definition of RBV to dynamic markets (Teece, Pisano, and Shuen, 1997). The rationale is that RBV has not adequately explained how and why certain firms have a competitive advantage in situations of rapid and unpredictable change. In these dynamic markets, where the competitive landscape is constantly shifting, dynamic capabilities, defined as those capabilities by which firm managers integrate, build and reconfigure internal and external competencies to address rapidly changing environments (Teece, Pisano, and Shuen, 1997)become the source of sustained competitive advantage. Dynamic capabilities include well-known organizational and strategic processes like alliancing and product development, both of whose strategic value lies in their ability to manipulate resources into value-creating strategies (Eisenhardt and Martin, 2000). They determine the speed at, and the degree to which, the firm's own resources can be aligned and realigned to match the requirements and opportunities of the business environment so as to generate sustained positive returns (Teece, 2012).

The above-mentioned initial dynamic capability researchers suggest that dynamic capabilities are simply substantive capabilities that operate within dynamic markets. Their broad structural patterns vary according to market dynamism, ranging from the robust, grooved routines in moderately dynamic markets to fragile semi-structured routines in high-velocity markets. They evolve via well-known learning mechanisms (Teece, Pisano, and Shuen, 1997; Eisenhardt and Martin, 2000).

More recently, researchers have argued that a volatile or changing environment is not a necessary component of a dynamic capability. However, dynamic capabilities may be most valuable when the external environment is changing rapidly or unpredictably (Zahra, Sapienza, and Davidsson, 2006).

The limited experience of NVs dictates that, especially in the very earliest stages, they will necessarily be confronted with many situations that they have never seen before. Young firms do not possess the slack resources that would allow time to plan actions or to experiment with different contingencies, even if forward planning might indeed pay off (Delmar and Shane, 2003).

Resource endowments are critically important for NVs and the development of dynamic capabilities is a mechanism that is likely to have a positive effect on performance. While NVs may well get off to a successful start with extremely limited resources, their continued development is contingent on dynamic capabilities whose own development requires a somewhat richer resource base (McKelvie and Davidsson, 2009).

The primary methods for discovering or developing dynamic capabilities in NVs compared to established firms are trial and error, or learning from experience. A firm must often invent solutions in order to survive. Learning is a path-dependent process wherein what firms learn depends on what they already know (Cohen and Levinthal, 1990) and how and what they learn, and how they change depends in part on the length of their history and the development stage of their organizational routines (Autio, Sapienza, and Almeida, 2000). Improvisation as opposed to planned change and experimentation. NVs without adequate time or resources to plan fully, and without a large repertoire of prior experience, will often be forced to improvise to create or enact solutions and imitation (Zahra, Sapienza, and Davidsson, 2006). Incentives to utilize and to eschew imitation exist for both younger and older firms. Because of the unpredictable nature of transferring practices across organizational boundaries, imitation can actually be a reasonable source of innovation (Aldrich, 1999), intentionally or unintentionally, for both young and old firms.

### 2.2.3 Dynamic managerial capabilities. What are they?

#### 2.2.3.1 Definitions

Adner and Helfat (2003) introduced the concept of DMCs in order to explain the portion of heterogeneity in firm performance associated with managerial decisions and actions. They did so by drawing on a set of underlying managerial resources that had already been defined, namely, managerial human capital, managerial social capital and managerial cognition. These resources in combination provide the basis for the patterned aspects of managerial intentionality, deliberation, decision making, and action (Martin, 2011).

DMCs are currently accepted as the capabilities with which managers create, extend and modify the ways in which firms make a living. They help to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance (Helfat and Martin, 2014).

In the following sections we briefly define three underpinnings of DMCs, which are human, social and cognitive managerial capital, paying particular attention to the context of NVs.

#### 2.2.3.2 Managerial human capital

Becker (1964) defined human capital as "learned skills that require some investment in education, training, or learning more generally". Managers acquire knowledge, develop expertise, and perfect their abilities through education and prior work experience.

Managerial human capital includes the skills and knowledge repertoire of managers, which is shaped by their education and personal and professional experiences (Becker, 1993; Castanias and Helfat, 2001). These authors have proposed in favour of the distinction between generic human capital (knowledge and skills which may be applicable to all industries and firms) and specific human capital (knowledge and skills which may be applicable to one industry or family of related industries, but not to others). Managerial experiences in specific contexts (according to the industry, the company and the geographical location, for example) allow managers to acquire and develop specific knowledge and skills (Harris and Helfat, 1997; Kor, 2003).

The implicit assumption is that, although we may not yet be able to explicitly identify or measure the specific knowledge and skills necessary for better firm performance, the more human capital there is the better. In the particular case of NVs, founders' and managers' past experiences serve as likely sources for this knowledge, and these skills will increase the probability that the required level of expertise in the requisite knowledge and skills will exist, and will subsequently lead to higher levels of NV performance (Amason, Shrader, and Tompson, 2006; Beckman, 2006; Nelson, 2003).

In the case of NVs, the prior specific experience of TMT has been associated with performance (McGee, Dowling, and Megginson, 1995). Building on this work, the results of researchers such as (Shrader and Siegel, 2007) suggest that NV performance is highest with TMTs that follow the strategies that are most closely aligned with managers' prior experience. In addition to this line of thought is the idea that the prior experience of a TMT in other industries may be beneficial in accessing resources (Siciliano, 1996). Human capital need not be industry- or firm-specific in order to create value for organizations (Campbell, Coff, and Kryscynski, 2012) but the value they create will differ. Complementarities among team members in terms of their human capital may have a positive impact on firm performance (Wright, Coff, and Moliterno, 2014). Thus, entrepreneurial firms seek out managers and directors with industry-specific experience when current executives lack such experience (Kor and Misangyi, 2008). The importance of these positive complementarities become evident as teams try to appoint directors with complementary or necessary skills as the need arises (Chhaochharia and Grinstein, 2007).

Importantly, in the context of NVs the concept of DMCs requires the consideration of entrepreneurial experience as part of managerial human capital. As Teece (2012) emphasizes, entrepreneurial managers create markets and orchestrate resources. Also, in an analysis of dynamic capabilities, Zahra, Sapienza, and Davidsson (2006) highlight the role of the entrepreneur in reconfiguring organizational resources and routines. By examining prior entrepreneurial experience, existing research has focused on a type of experience that has been of considerable interest for the study of different areas of new firm performance (Stuart and Abetti, 1990) such as NVs' survival (Delmar and Shane, 2004), NVs' growth (Colombo and Grilli, 2005), NVs' survival and sales (Delmar and

Shane, 2006), strategic decision speed (Forbes, 2005) and the number of opportunities identified (Gruber, MacMillan, and Thompson, 2012).

International experience has also been studied as part of managerial human capital. Some studies show how international managerial experience provides a positive context for the speed necessary to obtain foreign sales (Reuber and Fischer, 1997), international diversification (Tihanyi, Ellstrand, Daily, and Dalton, 2000), global strategic posture (Carpenter and Fredrickson, 2001) and international alliance formation (Lee and Park, 2008).

The managerial human capital framework provides a means to assess heterogeneity in managerial skills. Managers may vary in both the mix of their skills and the level of ability for each type of skill (Adner and Helfat, 2003). In this context, it is important to distinguish between depth and the breadth or diversity of acquired knowledge and experience. Past experiences provide access to a diversity or breadth of knowledge and skills that may drive the development of the specific types of managerial human capital that underlie dynamic managerial capabilities (Kor and Mesko, 2013; Martin, 2011).

Depending on the context, human capital diversity may facilitate positive outcomes for the firm, or it may constrain them, or it may balance them. Some scholars identify a research opportunity in this issue. The investigation of contextual factors may help us to understand the link between team diversity and performance (Johnson, Schnatterly, and Hill, 2013).

For instance, in dynamic industry environments, heterogeneous TMTs (where there is heterogeneity in prior experience in terms of functional background, level of education, educational specialty, and managerial skill) have been found to achieve more effective firm performance when led by a directive leader, whereas homogenous TMTs do best when led by an empowering leader (Hmieleski and Ensley, 2007). In contrast, within stable industry environments, heterogeneous TMTs achieve more effective firm performance when led by an empowering leader, whereas homogenous TMTs perform best when led by a directive leader.

Gruber, MacMillan, and Thompson (2012) found a positive relationship between the heterogeneity of the educational level of TMT members and the number of opportunities identified. Other authors have also found relationships between the number of opportunities identified and heterogeneity within the TMT. For instance, Kor

(2003) and Hambrick (1996) found that heterogeneity of firm tenure in the TMT may influence a management team's approach to identifying and seizing new growth opportunities.

In this way, the educational diversity of TMTs is positively related to the satisfaction of team members, but not to the perceived viability of teams by these same members (Foo, Sin, and Yiong, 2006). Similarly, Amason et al. (2006) found no direct relationship between the heterogeneity of TMTs' prior experience, in terms of level of education, specialization of education, and functional background, and firm performance.

Another interesting variable with which to assess managerial diversity has been gender. Although gender diversity in management teams is limited, studies of team composition show that in recent years it has increased, particularly in small and mid-sized companies. Low levels of heterogeneity (i.e. all male directors) can significantly reduce social integration (Williams and O'Reilly, 1998) and can impact negatively on firm performance (Westphal and Bednar, 2005).

#### 2.2.3.3 Managerial social capital

Earlier social capital research explored the connection between social capital and firms' value creation (Nahapiet and Ghoshal, 1997; Tsai and Ghoshal, 1998). The concept of social capital reflects the idea that social ties (e.g. friendships and social club memberships) and the goodwill that these ties may confer are transferred to other settings such as work. Social ties may also help to transfer information from one setting to another (Adner and Helfat, 2003). The concept of managerial social capital was introduced as managers' ability to access resources through relationships and connections (Adler and Kwon, 2002). This definition distinguishes between external social capital and internal social capital that are derived from ties outside and within an organization, respectively.

External social capital leads to access to external resources which provide information about practices in different firms which can improve firm performance (Geletkanycz and Hambrick, 1997). Strategy research on the social capital of managers has tended to focus on external ties, often in the form of directorships of other companies (Adner and Helfat, 2003). In the context of DMCs, social ties outside the

organization can provide access to resources such as financing and skilled personnel, both of which are needed for the investments necessary to seize opportunities (Pfeffer and Salancik, 2003).

In addition to external ties, managers generally possess internal social capital. Corporate managers depend upon information from division managers in order to make decisions. Business-level managers depend on corporate and sometimes other business-level managers for resources and information (Burt, 1997). Sources of internal social capital are those past experiences that have been shared with others (Beck and Wiersema, 2013). Advantageous positions in an internal social network, such as a position of centrality, may also confer power over resources that is useful in seizing opportunities (Helfat and Martin, 2014).

To the extent that managers differ in their network ties, both internal and external to the corporation, they will have different social capital and access to information. Differences in information sources may subequently lead managers to make different decisions (Adner and Helfat, 2003).

In the case of NVs, managerial social capital has been found to be more critical to performance than their initial teamwork capabilities. Network linkages to key resources drive partners to higher NV performance (Brinckmann and Hoegl, 2011). TMTs with extensive social networks tend to achieve superior performance, and such effects complement, rather than replace, the advantages gained by having diverse or heterogeneous founding teams (Vissa and Chacar, 2009).

Research interest in managerial social capital is growing within the NV literature, due to the fact that in the first stage of NVs, deep connections with close friends, family members or former managers who possess business-related knowledge are key (Klotz, Hmieleski, Bradley, and Busenitz, 2014). During this stage, having deep personal relationships with trusted individuals who can be called on for business advice, financial resources, and critical labour needs can make an important difference in being able to overcome specific difficulties (Zolin, Kuckertz, and Kautonen, 2011).

External networks play an important role in the identification of entrepreneurial opportunities and the development of such opportunities into viable businesses. Having a broad range of business-related connections is particularly important, because such relationships provide a wide range of information inputs that, when creatively

combined, form the raw material for developing entrepreneurial opportunities (Baron and Tang, 2009; Baron, 2006; Ozgen and Baron, 2007).

#### 2.2.3.4 Managerial cognition

Managerial cognition refers to managerial beliefs and mental models that serve as a basis for decision making (Prahalad and Bettis, 1986). Managerial cognition is shaped by personal and professional experiences, and managers' interactions in internal and external networks. Due to bounded rationality, managers may not have complete information about future events, alternatives and consequences (Adner and Helfat, 2003). Managerial cognition involves schemas and mental models that include a system of theories and propositions (Huff, 1990) that managers use to see their way through a bewildering flow of information to make decisions (Walsh, 1995).

Cognitive capability performs many different mental activities, such as those involving attention, perception and problem solving. Although these mental activities interact with one another, they are separable (Smith and Kosslyn, 2013). In this context, Helfat and Peteraf (2013) introduced the concept of managerial cognitive capability, which refers to the capacity of individual managers to perform mental activities. They identified specific types of cognitive capability that underpin dynamic managerial capabilities for sensing (attention and perception), seizing (problem solving and reasoning) and reconfiguring (language and communication, as well as social cognition), and explained their potential impact on strategic change in organizations.

Entrepreneurship researchers have made significant inroads in the study of shared cognition among TMT members (Klotz, Hmieleski, Bradley, and Busenitz, 2014). For instance, West (2007) advanced a model of collective TMT cognition and discovered an inverted U-shaped relationship between collective cognition and NVs' performance in which was such that firms led by TMTs with very high or low collective cognition experienced lower levels of performance than those led by TMTs with moderate levels of collective cognition. Chowdhury (2005) examined the relationship between cognitive comprehensiveness (how effectively TMTs developed a complete set of possible solutions to problems) and team effectiveness, and concluded that this relationship is positive even when controlling for the demographic diversity of team members.

Research has often used the demographic diversity of TMTs as a proxy for cognitive diversity, and has produced mixed results regarding the impact of such diversity on organizational performance (Finkelstein, Hambrick, and Cannella, 2009). Some researchers have used secondary sources of information such as letters to shareholders from company annual reports to estimate TMTs' mental models (Kaplan, Murray, and Henderson, 2003; Nadkarni and Narayanan, 2007). The prior shared experience and background characteristic of managers have served as an observable proxy for unobservable cognitive-mental models (Townsend and Busenitz, 2014). Indeed, organizational capabilities may be affected by pre-existing mental representations of the TMT (Laamanen and Wallin, 2009).

Shared prior experience within the TMT, which involves an overlap in human capital and social capital, is quite common. NVs are often founded by teams of friends, family members and work colleagues who share similar backgrounds and experiences (Reynolds, Bygrave, Autio, Cox, and Hay, 2002). Shared prior experience can enable TMTs to make quick and unified strategic decisions, which can be advantageous for effective performance in turbulent industry environments (Baum and Wally, 2003; Eisenhardt and Schoonhoven, 1990; Kor, 2003).

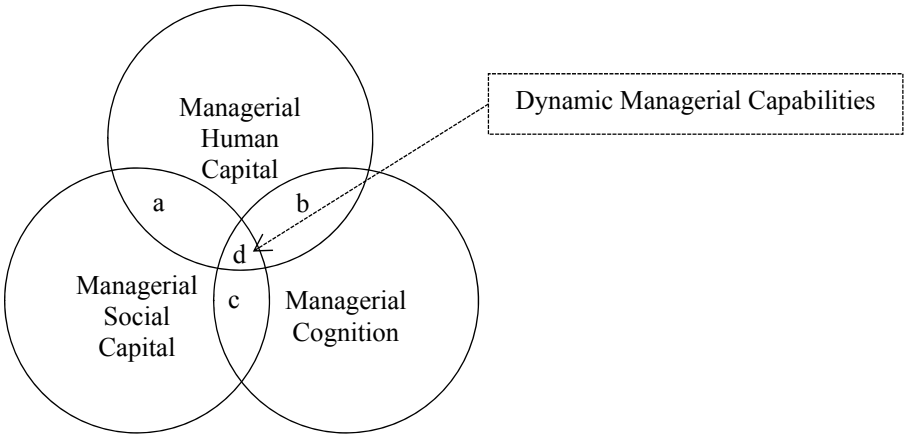
In the case of NVs, due to their limited existence, established routines and procedures are replaced by the prior experience of the founders and the TMT. In this way, common cognitive-mental models and the working cohesion of the team can exert a strong influence on performance.

### 2.2.4 Linkages among managerial human capital, social capital, and cognition

DMCs' underpinnings, managerial human capital, social capital, and cognition, do not have independent impacts on strategic change and performance (Adner and Helfat, 2003).

As Figure 2.1. shows, four interactions link the three managerial capabilities' underpinnings to one another. They not only have separate effects but also interact with one another. It is important to note that all three underpinnings develop through prior experience (Helfat and Martin, 2015). Therefore, the same experience may contribute simultaneously to the three attributes of DMCs (Beck and Wiersema, 2013).

**Figure 2.1. Dynamic managerial capabilities: underlying attributes**




Source: own elaboration.

For instance, interaction "a" (Figure 2.1.) shows us the linkages among managerial human capital and managerial social capital. Managerial human capital may affect the development of managerial social capital as managers seek to form social relationships in order to tap the expertise of others or are sought after for their expertise (Adner and Helfat, 2003). Human capital makes a manager more valuable and sought after as a board member of other companies, and a manager with greater social capital may earn higher returns for his or her human capital, mainly through the knowledge that managers obtain from their social relationships (Castanias and Helfat, 2001). Furthermore, social capital enables managers to identify promising opportunities (Burt, 1997), and provides information that augments their knowledge base (Boxman, De Graaf, and Flap, 1991). Certainly, managerial human and social capital complement one another, since they may both constitute important resources for the corporation, and both can even have a positive influence on the survival of companies (Geletkanycz, Boyd, and Finkelstein, 2001).

In the case of interaction "b" (Figure XXX), we can see linkages among managerial human capital and managerial cognition. Managerial human capital includes experience and knowledge that form part of the cognitive basis for managerial decisions (managerial cognition) (Hambrick and Mason, 1984; Adner and Helfat, 2003). The attention (as an aspect of cognition) that executives pay to different business issues may

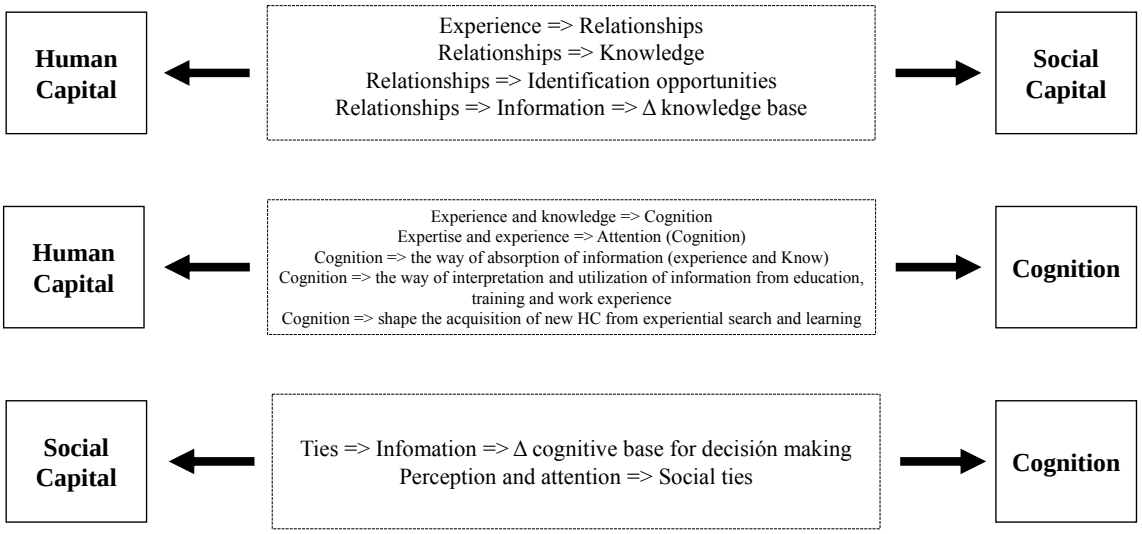
depend on their expertise and experience (human capital). In addition, managerial cognition affects the development of human capital by influencing the search for and absorption of information during education, training and work experience, as well as how managers interpret and utilize this information (Helfat and Martin, 2015). Mental models held by managers provide direction in the process of learning from experience. This suggests that managerial cognition and information processing shape the acquisition of new human capital via experiential searching and learning.

Finally, interaction "c" makes reference to linkages among managerial social capital and managerial cognition. External and internal ties provide access to information that augments the cognitive base for decision making (Adner and Helfat, 2003). In addition, elements of managerial cognition, such as perception and attention, are likely to affect which social ties managers seek to establish (Krackhardt, 1990; Helfat and Martin, 2015).

In the core of managerial human capital, social capital and cognition, we found interaction "d", which shapes the resource and capability base of the corporation through the action of dynamic managerial capabilities. In spite of these managerial resources also underpinning managerial capabilities that sustain current operations or what might be termed "managerial operational capabilities", our interest in this thesis concerns the dynamic aspects of these underpinnings and the ways in which these managerial resources enable managers to have an effect on strategic change, rather than other aspects of the broad literature on managerial cognition, social capital and human capital.

These interactions (Figure 2.2.) signal the importance of considering the three underpinnings of DMCs in combination in order not to incur errors and misinterpretations in the assessment of their origins and consequences.

**Figure 2.2. Interactions among DMCs' attributes**




Source: own elaboration.

## 2.3 Brief literature review

### 2.3.1 Review process

Our literature review departs from Helfat and Martin's (2015) recent paper about DMCs. The process was the following:

1. Our search focused on articles from scientific journals reviewed by experts in the ABI Inform and Scopus databases that included the concept of "dynamic managerial capabilities" in their abstracts.
2. We restricted the search to the top 5 general and specialized journals in the area of Entrepreneurship, and the top journals within the JCR index.
3. From 18 initial papers, we only kept those articles that linked DMCs to strategic change or performance.

The process yielded 11 theoretical and empirical articles in which the concept of DMCs is used in an implicit (for explaining other concepts) or explicit way (for explaining the DMCs themselves). Table 2.1. shows the identification data of the articles (title, author and year, journal), the type of research (theoretical or empirical, implicit or explicit use of the concept of DMCs), and the definition of or introduction to

the concept of DMCs. We would like to comment that the papers that only mention dynamic capabilities have not been included in this review (four papers).

Table 2.1. summarizes the nature of works on DMCs. Since the introduction of the concept in 2003, there have been seven theoretical and four empirical papers. However, only one of them empirically measures managerial capabilities and uses them as an independent variable to explain the early-stage capital raised.

**Table 2.1. Nature of works on DMCs: theoretical vs. empirical**

<table>
<tr><th colspan="3">Table Summary of<br>DMCs' papers<br>From Adner & Helfat (2003)</th></tr>
<tr><th colspan="3">Theoretical (7 papers)</th></tr>
<tr><td colspan="3">– Adner & Helfat (2003): introduction of DMCs' concept<br>– Salvato (2009): DMC as theoretical approach of evolution of capabilities from ordinary activities<br>– Martin (2011): DMCs as theoretical approach of executive leadership group<br>– Kor & Mesko (2013): DMCs linked to managerial dominant logic<br>– Beck & Wiersema (2013): DMCs linked to resource portfolio and strategic outcome<br>– Helfat & Peteraf (2014): DMCs as theoretical approach of managerial cognitive capabilities<br>– Helfat & Martin (2015): Theoretical review of DMCs' concept</td></tr>
<tr><th colspan="3">Empirical (4 papers)</th></tr>
<tr><th>DMCs are not measured<br>(It is used as theoretical approach of another concept)</th><th colspan="2">DMCs are measured</th></tr>
<tr><td rowspan="3">– Peteraf & Reed (2007): managerial discretion's concept (Established firms)<br>– Sirmon & Hitt (2009): set orchestration (Established firms)<br>– Eggers & Kaplan (2009): CEO attention (Established firms)</td><td rowspan="3">– Townsend & Busenitz (2014) (144 Early stage technology based ventures)</td><td>Dependent variable: early – stage capital raised</td></tr>
<tr><td>Independent variable: managerial capabilities, radical innovation, demand uncertainly</td></tr>
<tr><td>Method: negative binomial regression</td></tr>
</table>

Table 2.2. shows us the minute detail of the works and how DMCs have been defined. The title, authors and year, journal, type, definition and/or contribution to the concept of DMCs, objectives, and conclusions of each paper have been included.

**Table 2.2. Studies on dynamic managerial capabilities**

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| 1 | Corporate effects and dynamic managerial capabilities | Adner & Helfat (2003) | Strategic Management Journal | Seminal paper - explicit - (Introduction of DMCs' concept. Empirical and Theoretical) | *"... DMCs are the capabilities with which managers build, integrate, and reconfigure organizational resources and competences. DMCs reflect three underlying factors: managerial human capital, managerial social capital, and managerial cognition"* | To introduce the concept of dynamic managerial capabilities to underpin the finding of heterogeneity in managerial decisions and firm performance in the face of changing external conditions | - Even after accounting for other effects on the variance of profitability, corporate strategic decisions of just one type added a statistically significant increment to explained variance<br>- The new concept of dynamic managerial capabilities can help to explain differences in how managers respond to changes in the external environment<br>- Three attributes of managers underpin their dynamic capabilities, namely, managerial human capital, managerial social capital, and managerial cognition |
| 2 | Managerial discretion and | Peteraf & Reed | Strategic Management | Empirical - implicit - | *"... We also suggest a more specific mechanism* | To investigate the effects of | - When managers' discretion is limited in |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| | internal alignment under regulatory constraints and change | (2007) | Journal | (DMCs as theoretical approach of managerial discretion) | *underlying a DMC for achieving dynamic fit, facilitating organizational adaptation under changing conditions"* | regulatory constraints and their relaxation on managerial discretion and internal fit in the context of the U.S. airline industry | one realm of choice, they compensate by using their greater level of discretion in some other arena to achieve internal fit<br>- The ability to achieve fit under changing conditions may express a dynamic managerial capability necessary for adaptive organizational change |
| 3 | Capabilities unveiled: The role of ordinary activities in the evolution of product development processes | Salvato (2009) | Organization Science | Theoretical (case study) -implicit - (DMCs as theoretical approach of evolution of capabilities from ordinary activities) | *"DMCs may emerge from gradual refinement of lower-level organizational capabilities"* | To explore the role of capability evolution in underpinning organizational renewal | - Adaptive renewal is premised on a number of day-to-day activities, whereby mutations resulting from local search are first tested by internal or external selective forces, and then refined and reproduced by managerial intervention<br>- Organizations should hence become skilled in recognizing potentially |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| | | | | | | | valuable experiments occurring at all levels of the organization and, sometimes, outside its boundaries.<br>- The interpretation of resulting local experiments should be run by top managers as ad hoc problem solving, rather than by establishing innovation routines and operating rules |
| 4 | Contingencies within dynamic managerial capabilities: Interdependent effects of resource investment and deployment on firm performance | Sirmon & Hitt (2009) | Strategic Management Journal | Empirical - implicit - (DMCs as theoretical approach of asset orchestration) | *"DMCs focus on managers' resource-related decisions. Asset orchestration, a central component of DMCs and of resource management, highlights the importance of integrating (matching) resource investment and deployment decisions"* | To examine the contingent nature of resource investment and deployment decisions | - Firm performance is optimized by making congruent resource investment and deployment decisions as opposed to maximizing or economizing either decision independently<br>- Resource management via asset orchestration is vital for superior performance |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| 5 | Cognition and renewal: Comparing CEO and organizational effects on incumbent adaptation to technical change | Eggers & Kaplan (2009) | Organization Science | Empirical - implicit - (DMCs as theoretical approach of CEO Attention) | *"DMCs, such as managerial cognition, can create or reconfigure organizational capabilities so that the firm can adapt in the face of environmental change"* | To investigate the conditions under which managerial cognition affects the timing of incumbent entry into a radical new technological market | - Managerial cognition is important in understanding organizational outcomes, and considering both the direction of cognition and its interaction with organizational factors provides a more nuanced view of entry behavior<br>- Managerial cognition is therefore a dynamic managerial capability that can shape adaptation by established firms |
| 6 | Dynamic Managerial Capabilities and the Multibusiness Team: The Role of Episodic Teams in Executive Leadership | Martin (2011) | Organization Science | Theoretical - implicit - (Case Study) DMCs as theoretical approach of executive leadership group) | *"DMCs offer an opportunity to provide additional understanding of how differences in firm performance occur. A DMCs approach to understanding the executive leadership groups is likely to have greater prescriptive relevance than demography based approaches"* | To explore the relationship between the characteristics of the set of business-unit general managers and firm performance | - When the set of general managers operate as an episodic team they become an important element in complex organization's DMCs<br>- The business-unit general managers, individually and collectively, provide an exemplar of corporate entrepreneurs |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| | Groups | | | | | | |
| 7 | Dynamic managerial capabilities: Configuration and orchestration of top executives' capabilities and the firm's dominant logic | Kor & Mesko (2013) | Strategic Management Journal | Theoretical - explicit - (DMCs as origin of the managers' dominant logic) | *"In our current definitions, DMCs make things happen, but they fail to capture how the firm's set of managerial capabilities drive and are influenced by the unique configuration of resources and competencies in the firm. Thus, an in-depth understanding of DMCs requires new insight about (1) how DMCs themselves are configured and orchestrated and (2) how executives' capabilities result in (re)configuration of a firm's resources and capabilities"* | To build the concept of the firm's dominant logic as the missing link between the senior executive team's capabilities and renewal of the firm's resources and competencies | - They develop theory about how the underlying elements of DMCs give rise to managers' dominant logic, which in turn is linked to the firm's dominant logic<br>- They develop theory on how the executive configuration function creates and sculpts the management team's absorptive capacity, which then shapes the team's adaptive capacity |
| 8 | Executive decision making: Linking dynamic managerial capabilities to the resource | Beck & Wiersema (2013) | Journal of Leadership & Organizational Studies | Theoretical - explicit - (The role that DMCs play in fashioning a unique bundle | *"We propose that DMCs constitute a "unique core" to the resource bundle of the firm, which then drives the creation, extension, and modification of the firm's* | To provide an integrative framework that illustrates how strategic leaders influence firm strategy and | - There are multiple types of managerial capabilities, and DMCs constitute just one type of capability residing within the firm's management<br>- DMCs create a unique |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| | portfolio and strategic outcomes | | | of resources for the firm, thus leading to differences in firm strategies and performance outcomes) | *resource portfolio. This process results in the firm's "unique bundle of resources," and thus constitutes the basis for why firms differ in their strategies and performance"* | performance. | core or subset of resources at the heart of the resource portfolio of the firm |
| 9 | Turning water into wine? Exploring the role of dynamic capabilities in early-stage capitalization processes | Townsend & Busenitz (2014) | Journal of Business Venturing | Empirical - explicit - (DMCs are measured) | *"More radical innovations and higher levels of demand uncertainty appear to have little influence on the relative impact of managerial capabilities in early-stage capitalization processes"* | To examine the extent to which various trade-offs among the quality of a venture's management team, radicalness of the firm's technological resources, and demand uncertainty in focal markets impact the ability of ventures to resolve early capitalization challenges. | - Early-stage investors favor investing in firms where strong management teams are building more incremental technologies - When firms operate in markets characterized by a high degree of demand uncertainty, the incremental value of quality management teams is much less than that in more predictable market contexts |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| 10 | Managerial cognitive capabilities and the microfoundations of dynamic capabilities | Helfat & Peteraf (2014) | Strategic Management Journal | Theoretical - implicit - (Identification of specific types of cognitive capabilities whose heterogeneity may produce heterogeneity of DMCs among top executives) | *"…We introduce the concept of "managerial cognitive capability," which highlights the fact that capabilities involve the capacity to perform not only physical but also mental activities. We identify specific types of cognitive capabilities that are likely to underpin DMCs for sensing, seizing, and reconfiguring, and explain their potential impact on strategic change of organizations"* | To analyze the microfoundations of DMCs by the cognitive underpinnings of "managerial cognitive capability" | - Managerial cognitive capabilities may function as mediators of the relationship between changes in organizational context and strategic change, which in turn can affect firm performance<br>- Heterogeneity of these cognitive capabilities may produce heterogeneity of DMCs among top executives, which may contribute to differential performance of organizations under conditions of change |
| 11 | Dynamic Managerial Capabilities: Review and Assessment of Managerial Impact on Strategic Change | Helfat & Martin (2015) | Journal of Management | Theoretical - explicit - (Theoretical review about DMCs concept from Adner and Helfat (2003) | Theoretical review of DMCs' concept: *"…The concept of DMCs, the capabilities with which managers create, extend, and modify the ways in which firms make a living, helps to explain the relationship between the* | To clarify theoretical constructs and their relationships, review and synthesize empirical research on the role and impact of | - Empirical research shows that managers differ in their impact on strategic change and firm performance<br>- Differences in managerial cognition, social capital, and human capital lead to different |

| N | Title | Authors and year | Journal | Type | Definition and/or contribution to DMCs' concept | Objectives | Conclusions |
|---|---|---|---|---|---|---|---|
| | | | | seminal paper) | *quality of managerial decisions, strategic change, and organizational performance"* | managerial capabilities directed toward strategic change, and suggest avenues for future research" | outcomes |

### 2.3.2 Evolution of the concept of DMCs

The following text is taken from Adner and Helfat's (2003) original definition:

*"… Dynamic Managerial Capabilities are the capabilities with which managers build, integrate, and reconfigure organizational resources and competences. DMCs reflect three underlying factors: managerial human capital, managerial social capital, and managerial cognition"*

The concept has been enhanced by different features, such as the nature of its main goal:

- DMCs facilitate organizational adaptation under changing conditions (Peteraf and Reed, 2007).

- DMCs improve the quality and currency of information, reduce the many economic and political barriers inherent to conducting cross-unit activities, and enable general managers to tap into innovations and resources in each other's business units when formulating and deciding novel resource actions. Because general managers must reallocate resources from already-planned operational activities to pursue a novel collective resource action, such resource actions are likely to be relatively modest in scale. Effective DMCs among general managers improve the overall variation-selection-retention engine in multibusiness organization (Martin, 2011).

- CEO's DMCs in concerto with senior executives' managerial capabilities will drive top management's ability to revitalize the firm's dominant logic and to achieve evolutionary fit (Kor and Mesko, 2013).

- DMCs constitute a "unique core" to the resource bundle of the firm, which then drives the creation, extension, and modification of the firm's resource portfolio. This process results in the firm's "unique bundle of resources," and thus constitutes the basis for why firms differ in their strategies and performance (Beck and Wiersema, 2013).

- DMCs improve the firm's ability to attract investors. Early-stage investors favor investing in firms where strong management teams are building more incremental technologies, presumably because these technologies are easier to evaluate. In addition, when firms operate in markets characterized by a high degree of demand uncertainty, the incremental value of quality management teams is much less than that in more predictable market contexts. Again, predictability appears to trump the capabilities of

the management team in determining the amount of early-stage capital that the firm raises (Townsend and Busenitz, 2014).

Its origin,

- DMCs may emerge from day to day managerial activities of lower-level organizational capabilities (Salvato, 2009).

Its components,

- Asset orchestration (identifying complementarities, buying or building missing assets and then aligning them) directly affects firm's ability to adapt to changing conditions in their industry environments. Asset orchestration is a central component of DMCs which are therefore a key mechanism to achieve congruence between the firm's competencies and changing environmental conditions (Sirmon and Hitt, 2009).

- Managerial cognition is a dynamic managerial capability that can shape adaptation by established firms (Eggers and Kaplan, 2009).

And finally, Helfat and Martin review (2015) summarize existing studies of DMCs from their introduction and they offer a complete definition about what DMCs are:

*"… the concept of dynamic managerial capabilities—the capabilities with which managers create, extend, and modify the ways in which firms make a living—helps to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance"*

### 2.3.3 Identified gaps in DMCs' research

Aside from highlighting the development of the concept of DMCs and its nuances in terms of determinants and consequences, this literature review highlights that in spite of being a concept broadly studied, few are the studies that measure empirically the influence of DMCs on the performance, and rarely the context of NVs is analyzed. We can see (Table 2.1.) that only four of the papers analyzed in the theoretical review are empirical and, one out of four measures DMCs and use them as independent variable.

Different underpinnings of DMCs have been measured separately and their impacts on strategic change and/or performance have been analyzed (as explained in the following section 2.4). However, few are the researchers that study all underpinnings jointly and no study to our knowledge has offer a whole measurement of DMCs.

As table 2.1. shows Towsend and Busenitz (2014) is the only article to our knowledge that seeks to empirically measure DCMs. Interestingly, they did so in 144 early stage technology based ventures using the underpinnings advanced by Adner and Helfat (2003): 1) Managerial human capital: "the expertise and human capital required in decision-making;" 2) managerial social capital: social relationships which provide influence, control, and power; and 3) managerial cognition: beliefs and mental models that serve as the basis for decision-making. They examine the background characteristics of the management teams including the dominant skills and specialization, the complementary strength of the board, and managerial background characteristics such as prior entrepreneurship experience to serve as an observable proxy for unobservable cognitive - mental models. Specifically, the measure that they utilized to capture these critical dimensions of managerial capabilities evaluated the following dimensions: 1) The management team has prior industry/start-up experience; 2) the functional skill sets of the management team cover the major operational areas of the company; 3) the management team has a proven track record of achieving major milestones in previous endeavors; 4) the management team has access to a board of advisors/directors to provide critical social ties and mentoring. Two kinds of teams were identified: strong and weak. Their results suggest that early-stage investors favor investing in firms where strong management teams are building more incremental technologies. In addition, when firms operate in markets characterized by a high degree of demand uncertainty, the incremental value of quality management teams is much less than that in more predictable market contexts.

In the context of NVs, there is a lack of research that has longitudinally examined the characteristics of new venture teams across all stages of the entrepreneurial process (Klotz, Hmieleski, Bradley, and Busenitz, 2014). This is an important concern because some evidence suggests that different team characteristics may be more or less important at various phases in the development of NVs (Brixy, Sternberg, and Stüber, 2012). Moreover, DMCs emerge from characteristics of new venture teams members. Little is known about the evolution of these new venture teams according to the

evolution of the company. DMCs are key to adapt quickly to environment changes (Hmieleski and Ensley, 2007).

Implicit in focusing on DMCs instead of managerial capabilities is the changing environment. The character of dynamism implies the capabilities to manage quickly changes in the environment (Teece, Pisano, and Shuen, 1997). For instance, the empirical setting analyzed by Adner and Helfat (2003), faced the same market environment in each primary business. The major factor in the external environment that affected the profitability of the companies was the world price of crude oil. In this case, the strategic decision of downsizing, however, indicates that corporations did not respond similarly to the external environment. Thus, DMCs play an important role in strategic reorientations in response to changing conditions in the external environment.

Our literature review shows that some scholars have analyzed the relationship between environment and DMCs' components. For instance, managerial beliefs mediate the relationship between industry velocity and speed of firm response to shifts in the external environment (Nadkarni and Barr, 2008). Within stable industry environments, heterogeneous TMTs achieved greater firm performance when led by an empowering leader, whereas homogenous TMTs perform best when led by a directive leader (Hmieleski and Ensley, 2007).

However, we have not found empirical research that investigates the impact of environmental change or dynamism in the relationship between DMCs and performance.

## 2.4 Key components and measurement of DMCs in NVs

In this section we briefly review existing research that has tried to measure each of the three underpinnings of DMCs independently.

### 2.4.1 Managerial Human Capital in NVs

Prior research has argued that the survival of new ventures depends on the founder's human capital (Bates, 1990; Schoonhoven, Eisenhardt, and Lyman, 1990; Bruderl, Preisendorfer, and Ziegler, 1992). Mainly, human capital has been operationalized through work experience and knowledge. For instance, Becker (1964), conceptualized human capital refers to learned skills and knowledge that individuals develop through

their prior experience, training, and education. Previous researches (Gimeno, Folta, Cooper, and Woo, 1997), have operationalized general human capital as years of education, managerial experience, work experience, and specific (industry or firm) human capital as experience in expertise in specific functional areas of the same firm. In the case of NVs the effect of prior experience of TMT members conceptualized as the educational level specialization, and functional background of team members (Amason, Shrader, and Tompson, 2006), industry specific management experience and firm tenure (Finkelstein and Hambrick, 1996; Kor, 2003).

Knowledge gained through entrepreneurial experience shape the TMT's decisions and behaviours. Prior knowledge about markets, customer problems, and knowledge about how to serve markets will influence individuals' discovery of opportunities, thus influencing entrepreneurial behaviours (Shane, 2000).

International experience implies a broad vision of the business. The accumulation of experience and valuable knowledge as firms internationalize their operations improve the odds of organizational survival and success in markets (Mudambi and Zahra, 2007).

Table 2.3. includes studies that analyse managerial human capital in the context of new ventures. The case of NVs is different from established companies due to the lack of organizational experience and knowledge. Table 2.3. includes identification data of the studies, empirical setting research, type of new ventures, variable of human capital analysed, way of measurement and topic and results.

**Table 2.3. Measurement of managerial human capital in new ventures**

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| 1 | Designing new business startups: Entrepreneurial, organizational, and ecological considerations. Journal of Management (Van de Ven, Andrew H, Hudson, and Schroeder, 1984) | 14 firms in the educational courseware industry | Start-up firms | Expertise | 1. Level of education (l = high school, 2 = l-3 yrs. college, 3 = BA, 4 = MA, 5 = PhD); 2. Years of experience in courseware field before company startup; 3.Prior small business experienced (1 = no, 2 = yes) | Entrepreneurs' prior experience in large companies and level of education was positively correlated with the success of 14 educational courseware start-up firms |
| 2 | Entrepreneurship and the initial size of firms. Journal of Business Venturing (Cooper, Woo, and Dunkelberg, 1989) | 742 new independent U.S. business owners in diverse industries | New ventures (small and large) | 1. Dedication (full-time partners); 2. Level education; 3. Specific business courses; 4. Management experience; 5. Age when | 1. Dedication (full-time partners); 2. Level of education (1 = high school graduate or less, 2 = some college, 3 = Bachelor's degree or more); 3. Courses taken in business subjects (1 = none, 2 = 1 or 2, 3 = 3 or more); 4. Management | Founders of larger ventures had more general and management education, and more management, industry, and entrepreneurial experience than founders of smaller firms |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | became owner; 6. Previous organization; 7. Motivation and gender | experience (highest level) (1 = no subordinates, 2 = supervised workers, 3 = supervised managers, 4 = managed or owned own business, 5 = Other); 5. Age when became owner (1 = 27 or less, 2 = 28 to 37, 3 = 38 to 47, 4 = 48 or more); 6. Previous organization (1 = Large or medium business (> 100 employees), 2 = Small business (<100 employees), 3 = had own business, 4 = non-profit organization or not in labor force); 6. Most important goal when started (most important), (1 = to let you do the kind of work you wanted to do, 2 = to avoid having to work for others, 3 = to make more money than you would otherwise, 4 = to | |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | build a successful organization); 7. Sex and minority status (1 = women, 2 = minorities) | |
| 3 | Entrepreneur human-capital inputs and small business longevity. Review of Economics and Statistics(Bates, 1990) | Non-minority males entering self-employment in the U.S. | Self - employees: owners who were white males who entered into small business ownership between 1976 and 1982 | 1. Years of education, 2. Family self-employment and 3. Managerial experience | 1. Years of education (1 = 4 years of high school, 2 = at least one but less than four years of college, 3 = four years of college, 4 = five or more years of college; 2. Family self-employment (for owners whose close relatives (mother, father, brothers, sisters, others with whom frequent con- tact was maintained) either owned a business or were self-employed in professional practice, Family = 1, otherwise Family = 0), 3. Management experience (for owners who had worked in a managerial capacity prior to | Founders' years of education were positively associated with firm survival. Prior managerial experience had no effect. |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | owning the business they owned in 1982, Management = 1; otherwise Management = 0) | |
| 4 | Impact of entrepreneurial and management experience on early performance. Journal of Business Venturing (Stuart and Abetti, 1990) | 52 public and private technical firms in the New England-New York area | Chief executives of 52 new technical ventures in the New York / New England area. | Experience as multidimensional construct | 1. Entrepreneurial Experience: reflects the number of previous new ventures and the role played in such entrepreneurial ventures by the entrepreneur. 2. Management level: the entrepreneur's highest level of management responsibility previous to starting the venture. 3. Leader's Experience: the total business experience of the leader. 4. Age: entrepreneur's age. 5. Education: the level of education of the entrepreneur. 6. Management experience: the years of management experience of the | Prior entrepreneurial experience was positively correlated with early performance of new ventures, but prior management experience were not |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | entrepreneurial team. 7. Technical experience: the years of technical experience of the entrepreneurial team. 8. Marketing experience: the years of marketing experience of the entrepreneurial team. 9. Financial experience: years of financial experience of the entrepreneurial team. 10. Team's total experience: total years of experience of the entrepreneurial team. | |
| 5 | Organizational growth: Linking founding team, strategy, environment and growth among U.S. semiconductor ventures. | 98 U.S. merchant semiconductor firms founded in the U.S. between 1978-1985 | Technology-based ventures | Top-Management-Team Measures: 1.Joint experience, 2.Team size, 3. Heterogeneity of industry experience | 1. Joint experience: number of founding executives who had worked with another founding executive for at least six months prior to founding the company divided by the total number of founding executives (0-1), 2. Team size: numbers of | Founding team heterogeneity of prior industry work experience was marginally positively associated with sales, but joint prior work experience of the team was not |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | Administrative Science Quarterly (Eisenhardt and Schoonhoven, 1990) | | | | founders.3. Heterogeneity of industry experience: standard deviation of the number of years of semiconductor-industry experience for all executives on the founding team. | |
| 6 | Speeding products to market -- waiting time to 1st product introduction in new firms. Administrative Science Quarterly (Schoonhoven, Eisenhardt, and Lyman, 1990) | 98 U.S. merchant semiconductor firms founded in the U.S. between 1978-1985 | Technology-based ventures | Entrepreneurial team: 1. Industry experience, 2. Entrepreneurial experience, and 3. Joint experience | 1. Industry experience: the average number of years of semiconductor industry experience on the founding team obtained prior to founding the current new venture, defined as years spent as an employee of a merchant producer of semiconductor devices. This was calculated as the arithmetic mean of the individual founders' semiconductor industry experience. 2. Prior experience in a start- up | Neither founding team prior industry experience, previous start-up experience, nor previous experience working together were associated with time to first product shipment |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | company: proportion of founding managers who had previously worked in a start-up firm during its first twelve months after founding (0-1). 3. Joint work experience: the proportion of entrepreneurs who had worked with any of the others prior to founding the new venture (0-1). | |
| 7 | Characteristics distinguishing high-growth ventures Journal of Business Venturing (Siegel, Siegel, and Macmillan, 1993) | Two samples of approximately 1705 new ventures | Entrepreneurial companies | Experience in similar industry | Experience in similar industry was measured by the number of years the entrepreneurial team had worked in a similar industry. | Number of years of industry experience of the entrepreneurial teams was higher in high growth ventures and lower in low-growth ventures |
| 8 | Initial human and financial capital as predictors of new venture performance. | 2994 entrepreneurs and their firms, representing all industries and | New ventures | 1. General background, 2. Management know-how, 3. Specific industry | 1. General background: education (1 = at least bachelor's degree), gender and race, 2. Management know-how: parents who | Entrepreneurs having a higher level of education and industry-specific experience were strongly significant predictors of both marginal |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | Journal of Business Venturing (Cooper, Gimeno-Gascón, and Woo, 1997) | geographic areas of the US | | know-how | owned businesses, non-profit organization, level of management experience (1 = highest level of management before going into venture was "supervising one or more managers"), use of professional advisor (scale), partners (number of full-time partners), 3. Specific industry know-how: business similarity (scale) | survival and growth of the new ventures they founded |
| 9 | Growth of new technology based firms: Which factors matter? Small Business Economics (Almus and Nerlinger, 1999) | West German new technology based ventures founded 1989-1996 | New Technology-Based Firms | Human capital of founders (or founding team) | Technical and engineering skills, MBA skills and TEC and MBA skills | Founders with technical degrees had a positive and significant effect on growth. Founders with an MBA had a positive and significant effect only on non-innovative firms |
| 10 | Fast-Growing Businesses: Empirical | 1291 business founders, 1985-1986 in West | Newly founded businesses in West Germany | Founder characteristics: demographics | 1. Demographics attributes (gender and nationality), 2. General and specific human | Probability of rapid new venture growth was positively associated with |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | Evidence from a German Study. International Journal of Sociology (Bruderl & Preisendorfer, 2000) | Germany | | attributes, general and specific human capital | capital: education (years of schooling), work experience (years of work experience), industry-specific experience, self-employment experience and management experience (dummy variables) | founder education and years of industry and management experience |
| 11 | The internationalization of new and small firms: A resource based view. Journal of Business Venturing (Westhead, Wright, & Ucbasaran, 2001) | SMEs in Great Britain in 1997 | Small- and medium-sized enterprises (SMEs) | Characteristics of principal founder: entrepreneur's human capital, general human capital, management know-how, industry-specific know-how, ability to acquire financial capital | 1. Gender: Male founder (1 yes), 2. Founder's parents immigrants (1 = yes), 3. Education: founder has an undergraduate or postgraduate university degree (1 = yes) 4. Parents owner business (1 = yes) 5. Age of the founder 6. Founder held a managerial or professional position for last employer prior to start-up (1 = yes), 7. Habitual founder with previous business ownership experience (1 = yes), 8. Two or more | Export sales positively related to prior industry experience of the founder but not related to founder education level or prior managerial experience |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | shareholders or partners in the business (1 = yes), 9. Policy and support service used (1 = yes), 10. Business started in the same industry as last employer (1 = yes), 11. Sales exported outside the UK (1 = yes), 12. Received financial investment during the last financial year (1 = yes) | |
| 12 | Experience-based top management team competence and sustained growth. Organization Science (Kor, 2003) | 73 technology firms that went public between 1990 and 1995, and were founded between 1960 and 1995 | Entrepreneurial firms from the medical and surgical instruments industry | 1. Founder-Based Firm-Specific Experience in the TMT, 2. Shared Team-Specific Management Experience, 3. Industry-Specific Management Experience, and 4. Heterogeneity | 1. Founder-Based Firm-Specific Experience in the TMT: is the ratio of the number of founders who are active in the top management team to the size of the team, 2. Shared Team-Specific Management Experience: the number of years of shared experience for the four managers with the longest tenure in the TMT, 3. | The annual rate of sales growth was positively associated with founder-based experience in the TMT and industry experience of the TMT to a lesser extent |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | of firm tenure in the TMT (control variable) | Industry-Specific Management Experience: the average number of managerial positions the managers previously held in the same industry. 4. Heterogeneity of firm tenure in the TMT standard deviation of firm tenure divided by the average level of firm tenure in the team (Hambrick et al. 1996). | |
| 13 | Legitimating first: organizing activities and the survival of new ventures. Journal of Business Venturing (Delmar and Shane, 2004) | 223 Swedish new ventures founded in 1998 | New ventures | Human capital: venture team's industry and start-up experience | 1. Prior start-up experience as a count of the number of prior firms founded across the team pursuing the new venture, 2. Prior industry experience as the number of years of experience in the new venture's industry across the team pursuing the new venture. (1 y 2 time invariant) | Ventures with greater team industry experience were more likely to complete product development. Greater prior start-up experience also was associated with longer survival, but prior industry experience was not significant |
| 14 | Managerial | 115 'Silicon | New ventures | Human capital | 1. Age and 2. New venture | Internet-related new ventures |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | determinants of decision speed in new ventures. Strategic Management Journal (Forbes, 2005) | Alley' (New York) internet related new ventures in 1999 | | | prior experience: coded 1 one or more such experiences. | managed by older entrepreneurs and those with prior new venture experience made faster strategic decisions |
| 15 | How dynamics, management, and governance of resource deployments influence firm level performance. Strategic Management Journal (Kor & Mahoney, 2005) | 60 entrepreneurial medical instruments companies, 1990-1995 | Entrepreneurial firms | Specific experience | Top management firm-specific experience is measured as average firm tenure (i.e., the number of years that managers spent in a particular firm) of the top managers. | Average firm tenure of top managers positively moderated the impact of R&D intensity (R&D expenditures/total assets) on firm performance (Tobin's q) |
| 16 | Founders' human capital and the growth of new technology-based firms: A | 506 Italian New Technology Based Firms (NTBFs) in 16 technology | Start-up | Founder's human capital: general education, economic | 1. Education: average number of years of education of founders, 2. *Ecoeduc*: average number of years of economic and/or managerial | Average number of years of prior work experience for the founder's in the same industry sector at the new venture was strongly and |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | competence-based view. Research Policy (Colombo and Grilli, 2005) | sectors | | education, technical education, general work experience, specific work experience (industry and technical sector of start-up), commercial experience, other experience, prior management position, and prior entrepreneurial experience | education of founders at graduate and post-graduate level, 2. *Techeduc*: average number of years of scientific and/or technical education of founders at graduate and post-graduate level, 3. *Workexp*: average number of years of work experience of founders before firm's foundation, 4. *Specworkexp*: average number of years of work experience of founders in the same sector of the startup before firm's foundation, 5. *Techworkexp*: average number of years of technical work experience of founders in the same sector of the start-up before firm's foundation, 6. *Comworkexp*: average number of years of commercial work experience | positively related to venture annual employment growth—for technical rather than commercial experience |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | of founders in the same sector of the start-up before firm's foundation, 7. *Otherworkexp*: average number of years of work experience of founders in other sectors than the one of the start-up before firm's foundation, 8. *DManager*: one for firms with one or more founders with a prior management position in a company with more than 100 employees, 9. *DEntrepreneur*: one for firms with one or more founders with a previous self-employment experience | |
| 17 | Does experience matter? The effect of founding team experience on the survival and sales of newly founded | 223 Swedish new ventures founded in 1998 | New ventures | Industry experience and start-up experience | 1. Industry experience: the log of the total number of years of experience in the industry across all founding team members, 2. Start-up experience: the log of the | Prior experience in start-up firms was associated with longer venture survival and to a lesser extent with higher sales. Founding team prior industry experience was |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | ventures. Strategic Organization (Delmar and Shane, 2006) | | | | total number of firms previously started by the members of the founding team | positively associated with sales |
| 18 | The cumulative nature of the entrepreneurial process: The contribution of human capital, planning and environment resources to small venture performance. Journal of Business Venturing (Haber & Reichel, 2007) | 305 small tourism ventures in Israel in 1999 | Small tourism ventures | Managerial skills of the entrepreneur: education, entrepreneurial experience and business skills | 1. Education: 8-point ordinal scale from 1, elementary education, to 8, undergraduate degree, Master's degree or higher, 2. Previous entrepreneurial experience: open questions, indicating the number of businesses established and operated by the respondent, including the current found previous entrepreneurial experience to be a meaningful factor in predicting the propensity to embark on the establishment of additional new ventures, 3. Business skills index: an index was constructed on the | Short and long-term performance of ventures was positively associated with business skills of the entrepreneur |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | basis of six questions, including acquisition of financing, personnel management, product innovation, ongoing business operation, strategic management, marketing and selling, with answers on a Likert scale ranging from 1 = poor to 7 = excellent | |
| 19 | The role of managers' political networking and functional experience in new venture performance: Evidence from China's transition economy. Strategic Management Journal (Li and Zhang, 2007) | 300 new technology ventures in China (no year given in study) | New ventures | Functional experience | Functional experience was measured with five items that reflect the extent to which members of the senior management had functional experience in the following areas: 1 = sales/marketing; 2 = R&D/engineering; 3 = manufacturing; 4 = finance; and 5 = administration. This measure indicates the overall experience of a venture's senior management across the | Senior management functional area experience was positively associated with new venture performance, and the relationship was stronger in state-owned than non-state owned enterprises |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | various functional areas. | |
| 20 | From minds to markets: How human capital endowments shape market opportunity identification of technology star-ups. Journal of Management (Gruber, MacMillan, and Thompson, 2012) | 133 German technology venture capital backed firms | Star-ups | Human capital endowments: educational specialization diversity, educational level diversity, management, marketing, technological and entrepreneurial prior experience | 1. Educational specialization diversity: Shannon index categories: management education, technological education, and other type of educational specialization, 2. Educational level diversity: occupational training, university degree, PhD, and other type of highest degree, 3. Management, marketing and technological experience: 5-point Likert-type scales ranging from very poor to very strong, 4. Entrepreneurial experience: division of the number of founding team members with entrepreneurial experience by the total number of team members. | Management and technological experience was positively related to opportunity identification, sales/marketing experience was negatively related, and interaction of entrepreneurial experience with technological and marketing experience was positive |
| 21 | Human capital and | 1.151 | University | Education and | Education: Academic (1 = | Academics with technical |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial human capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | new venture performance: the industry choice and performance of academic entrepreneurs, Journal Technology Transfer, (Nielsen, 2015) | individuals starting new ventures in 133 different industries | Start-ups | industry experience | university degree on master or PhD), Tech (1 = university degree on Master or PhD level within natural science, engineering science, or medical science). Experience: The number of years that the entrepreneur worked in the start-up industry five years before the start-up based on 4-digit NACE industry codes. | degrees performed better than non-academics in both stable and unstable industry environments |

### 2.4.2 Managerial Social Capital in NVs

As stated before, managerial social capital involves managers' abilities to access resources through relationships and connections (Adler and Kwon, 2002). There are two main types of social capital: internal and external and each one brings different strengths to the team (Tian, Haleblian, and Rajagopalan, 2011).

Traditionally, internal social capital has been defined in terms of the team's co-working experience. Previous research (Barkema and Shvyrkov, 2007; Tian, Haleblian, and Rajagopalan, 2011), calculate TMT co-working experience as the overlap in executive directors' team tenures based on the following formula:

$$tenure\ overlap = \frac{1}{n}\sum \min(u_i; u_j),$$

where $u_i$ is the team tenure of the $i^{th}$ executive and n is the number of pairwise comparisons.

In the case of new ventures, other way of working out internal social capital is through joint experience. For instance, Eisenhardt and Scoonhven (1990) in a sample of 98 technology-based ventures, measured join work experience of founding teams in two steps. First, they determined the number of founding executives who had worked with another founding executive for at least six months prior to founding the company. Second, this number was divided by the total number of founding executives. This variable ranges between 0, for teams in which none of the founders had previously worked together, and 1, for teams in which all of the founders had previous work relationships together.

External social capital leads to access to external resources. Frequently, external ties have been operationalized in the form of directorships of other companies (interlocks) by strategy researchers on the social capital of managers (Wincent, Anokhin, and Örtqvist, 2010). For instance, Carpeter and Westphal (2001) examined how external network ties determine a board's ability to contribute to the strategic decision making process. Thus, they measured related board appointments in stable environments across four different strategic dimensions: product market, foreign market, diversification and appointments related by degree of internationalization. In general, the related boards appointments are measured as the number of a director's

appointments to the board (related to the strategic dimension) divided by the director's total number of appointments.

The impact of social capital on new ventures has been of particular interest in recent years. Social capital has been shown to contribute to new venture formation and growth in several ways, including motivating nascent entrepreneurs through the start-up process (Prashantham and Dhanaraj, 2010), helping them with capturing alliance opportunities (Li, 2013), and enabling them to internationalize their operations (Prashantham, Dhanaraj, and Kumar, 2015). However, there are few studies about how internal and external social capital of NVs' TMT may affect the strategic change and the performance in NVs.

We propose in this thesis, measuring TMT's internal social capital through tenure overlap in order to quantify the influence on NVs' performance of internal ties. We propose that more cohesive teams have higher performance than those without internal ties. Moreover, it is little known the effect on the survival and growth of NVs of external ties or interlocks that TMT's hold in other companies.

Table 2.4. includes studies that analyse managerial social capital in the context of new ventures. The case of NVs is different from established companies due to the importance that previous links have over the first stage of firms. Table XXXX includes identification data of the studies, empirical setting research, type of new ventures, variable of social capital analysed, way of measurement and topic and results.

**Table 2.4. Measurement of managerial social capital in new ventures**

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial social capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| 1 | The Dynamic Influence of Social Capital on the International Growth of New Ventures. Journal of Management Studies (Prashantham and Dhanaraj, 2010) | Four new ventures in the Bangalore software industry, 2002–05 | New ventures | Initial ties | Initial network relationships, role of initial social capital in driving international growth, indicative quote (case studio) | Found that in three of the cases, the entrepreneurs had pre-existing social relationships in the U.S. and in U.S. multinational firms that facilitated entry into the U.S. market |
| 2 | Multilateral R&D alliances by new ventures, Journal of Business Venturing, (Li, 2013) | 173 new ventures involved in multilateral R&D alliances in high-technology industries during 1990–2005, and 173 | New ventures | Size and diversity of TMT | Size of a new venture's top management team is measured by the number of top executives (TMT size). TMT diversity of the team as the reverse of the overlap measure of the team's prior affiliations $1-\sum nP_i^2$, where $n$ is the number of unique firms that team members have worked | Top management team's social capital and ventures' technological capabilities are critical for new ventures to identify and capture alliance opportunities. |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial social capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | matching ventures that are not involved in multilateral R&D alliances during the same time period | | | for, and $P_i$ is the proportion of team members that worked for firm *i*. Up to three prior firms are considered for each team member. | |
| 3 | Ties That Bind: Ethnic Ties and New Venture Internationalization, Long Range Planning, (Prashantham, Dhanaraj, and Kumar, 2015) | Four new ventures in the Bangalore software industry, 2002–05 | New ventures | Ethnic and non-ethnic ties | 1. Ethnic ties: With respect to firms run or managed by fellow-Indians in your largest international market: 1 = We actively utilize these relationships in our business, 2 = These relationships are characterized by close interactions, 3 = These relationships are characterized by mutual trust, 4 = These relationships are highly reciprocal, 5 = These relationships have 'opened | Found that internationalizing new ventures based outside clusters are more likely to accumulate ethnic ties compared to new ventures based within clusters. Non-ethnic ties are more likely to be positively associated with new venture internationalization than are ethnic ties The relationship between ethnic ties and internationalization is stronger for new ventures based within |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial social capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | | | | | new doors' for us. 2. Non-ethnic ties: With respect to firms run or managed by non-fellow-Indians in your largest international market: 1 = we actively utilize these relationships in our business, 2 = these relationships are characterized by close interactions, 3 = these relationships are characterized by mutual trust, 4 = these relationships are highly reciprocal, 5 = these relationships have 'opened new doors' for us | clusters relative to new ventures outside clusters |
| 4 | Human capital and new venture performance: the industry choice and performance of academic entrepreneurs, | 1.151 individuals starting new ventures in 133 different industries | University Start-ups | Contacts and ownership | Contact (1 = contact to persons mainly known as "former work colleagues or business relations'' every or almost every week (including contact over mail, phone). Ownership (1 = started the business in | Academics with technical degrees performed better than non-academics in both stable and unstable industry environments |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial social capital | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | Journal Technology Transfer, (Nielsen, 2015) * | | | | joint ownership with others. The variable is an aggregated measure based on the respondent's answer about joint owner-ship with the following groups: "family members'', ''colleagues from before I started the business'', ''other friends through years before I started the business'' or ''other persons'' | |

Note: * articles analyze human and social capital in the same model

### 2.4.3 Managerial Cognition in NVs

Managerial cognition may help to explain why some top managers have more effective capabilities than others for anticipating, interpreting, and responding to the demands of an evolving environment (Helfat and Peteraf, 2014). It is shaped by different mental activities, such as those involving attention, perception, and problem solving. In the case of NVs, managerial cognition is defined as knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth (Mitchell, Busenitz, Lant, McDougall, Morse, and Smith, 2002).

NVs are often started by founders with prior shared experience, which has been shown to benefit new venture performance. Shared prior experience of TMT, overlap in human capital and social capital is quite common. It can enable TMTs to make quick and unified strategic decisions (Kor and Misangyi, 2008). Early studies have shown that prior shared experience constitutes a key entrepreneurial resource that founding teams can leverage and hence is positively correlated with new venture performance (Eisenhardt and Schoonhoven, 1990; Kor, 2003). Moreover, teams with higher prior shared experience are more cohesive. The members of cohesive teams exhibit higher levels of affinity and trust for one another as well as higher levels of satisfaction with, and affective attraction to, the group as a whole (O'Reilly, Caldwell, and Barnett, 1989).

Prior shared experience and background characteristic of managers have served as an observable proxy for unobservable cognitive - mental models (Townsend and Busenitz, 2014). For instance, Laamanen and Wallin (2009) found that pre-existing mental representations of the CEOs and top managers affected how the companies developed their capabilities.

Ensley and Pearce (2001) defined shared strategic cognition in TMTs as the extent to which those mental models about strategy are shared. They measured shared strategic cognition as the coefficient of variation of the Strategic Orientation of Business Enterprises or STROBE scale (Venkatraman, 1989). The research posed that shared strategic cognition is the outcome of group processes that occur during the development of strategy. The results indicated that the group processes leading to the development of shared strategic cognition are more important than the outcome of shared strategic cognition in terms of predicting organizational performance.

Earlier researchers included prior shared work experience in their studies as a proxy of the shared mental model and cohesion of the team e.g.(Harris and Helfat, 1997; Carroll and Harrison, 1998; Kor, 2003; Barkema and Shvyrkov, 2007). More recently, Zheng (2012) argues that the observed prior shared experience effect may actually reflect an underlying team cognitive process. His results show that prior shared experience enables founding teams to effectively and efficiently integrate their members' expertise and skills. He measures prior shared experience using an approximation of tenure overlap (internal social capital) formula:

$$pre-tenure\ overlap = \frac{1}{n_{it}\ \frac{n_{it}-1}{2}} \sum \min(u_{itk}; u_{jtk}),$$

where $d_{ij}$ is dichotomy variable which shows whether or not founder *i* and *j* had shared working experience together before, and *n* is the number of founders. This variable is a continuous one with a theoretical minimum of 0 (no prior shared experience) and maximum of 1 (complete prior shared experience).

Table 2.5. includes studies that analyse managerial cognition in the context of new ventures. The case of NVs is different from established companies due to the importance of previous shared experience have in order to compose cohesive teams and building shared mental models. Table 2.5. includes identification data of the studies, empirical setting research, type of new ventures, variable of managerial cognition analysed, way of measurement and topic and results.

**Table 2.5. Measurement of managerial cognition in new ventures**

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial cognition | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| 1 | Cognitive Dynamics of Capability Development Paths. The Journal of Management Studies (Laamanen and Wallin, 2009) | Three software firms and their evolution from their establishment (1988, 1990, and 1996) to 2006 | Star-ups | Cognitive intentions and the subsequent actions | Longitudinal case study (3 firms). Cognition: pre-existing mental representations (experience accumulate) and managerial attention | Pre-existing mental representations of the CEOs and top managers affected how the companies developed their capabilities, and the allocation of attention affected which capabilities became the focus of development |
| 2 | The successful intelligence of high growth entrepreneurs: Links to new venture growth. Organization Science (Baum and Bird, | 146 owner-managers who had founded firms in the printing and graphics industry | New ventures | Successful intelligence: Practical, analytical, creative, emotional and social intelligence | Practical intelligence: Scenario-var. vs. expert, analytical intelligence: cognitive complex' grid, creative intelligence: remote word association, emotional and social intelligence: 5-point scales | 'Successful intelligence', including reasoning and problem-solving capabilities, were positively related to swift action and multiple improvement actions, which in turn were positively related to growth |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial cognition | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | 2010) | | | | | |
| 3 | Shared cognition in top management teams: Implications for new venture performance. Journal of Organizational Behavior (Ensley and Pearce, 2001) | TMTs of 88 and 70 new ventures, all of which were members of the 1994 and 1995 inc. 500, respectively. | New ventures | Shared strategic cognition | Shared strategic cognition was measured as the coefficient of variation of the Strategic Orientation of Business Enterprises or STROBE scale. The STROBE scale, developed by Venkatraman (1989), is a 33 item, seven dimension scale intended as a measure of business level strategy | The results indicate that the group processes leading to the development of shared strategic cognition are more important than the outcome of shared strategic cognition in terms of predicting organizational performance |
| 4 | Unlocking founding team prior shared experience: A transactive memory system perspective. | 142 start-ups in four regions of China that have different levels of entrepreneurial activities. | Star-ups / New ventures | Prior shared experience | Prior shared experience (pre-tenure overlap): $\Sigma D_{ij} /(N*(N-1)/2)$, where $D_{ij}$ is an indicator variable showing whether or not founder i and j had shared working experience together before, and N is the number of founders. This variable is a | Prior shared experience effect is partially mediated by a team-level cognitive process-transactive memory system that enables founding teams to effectively and efficiently integrate their members' expertise and skills. Two team-level factors: task |

| N | Article | Empirical Setting Research | Origin of NVs | Variable of managerial cognition | Measurement | Topic and Results |
|---|---|---|---|---|---|---|
| | Journal of Business Venturing (Zheng, 2012) | | | | continuous one with a theoretical minimum of 0 (no prior shared experience) and maximum of 1 (complete prior shared experience) | similarity and intra-team trust further strengthen the effects of transactive memory systems because they provide golden opportunities and strong motivation for team members to utilize their transactive memory systems |

## 2.5 Conclusions

From the first definition of DMCs from Adner and Helfat (2003)

*"Dynamic Managerial Capabilities are the capabilities with which managers build, integrate, and reconfigure organizational resources and competences. DMCs reflect three underlying factors: managerial human capital, managerial social capital, and managerial cognition"*

To the last one from Helfat and Martin (2015)

*"Dynamic managerial capabilities are the capabilities with which managers create, extend, and modify the ways in which firms make a living and help to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance"*

Many researchers have studied in deep the concept as well as its three underpinnings: managerial human capital, managerial social capital and managerial cognition. However, less in known about how these capabilities are developed in the case of new ventures.

New ventures, those companies eight years or younger (McDougall, Robinson, and DeNisi, 1992), lack of organizational experience, established procedures and routines as organizational capabilities arise overtime from the routinization of activities and procedures (Dosi, Nelson, and Winter, 2000). However, existing research argues that in the absence of organizational capabilities founders' characteristics such as prior work experience, social ties, prior shared experience, traits, abilities or emotions may aggregate to create collective capabilities (Winter, 2012).

The role of the founding team is therefore key in order to understand the origin of DMCs in NVs. The literature review above signals the lack of previous studies where the NVs setting is analyzed. In the case of managerial human capital, levels of knowledge and prior general and specific experience have been used. Specifically, entrepreneurial capital is often measured as the number of companies founded and/or the of previous experience in new ventures (either mean of years of dichotomous variable). Different results are obtained with regard to the influence of entrepreneurial capital on NVs performance.

With regard to social capital, initial networks relationships clearly have a strong impact on NVs' performance. They help to identify new opportunities, to entry new markets and even to get financial resources. However, we miss measurements as tenure overlap (internal social capital) and interlocks (external social capital), which involve managers' abilities to access resources through relationships and connections both internal and external.

In spite of being a difficult measurement, managerial cognition has been worked out through variables as pre-existing mental representation, different kinds of TMT's intelligence, shared strategic cognition and prior shared experience. We find this variable very interesting because may be consider as a proxy of the shared mental model and cohesion of the team.

Overall, this literature review signals the need to understand DMCs through a global vision accounting for all three underpinnings together and assessing their impact on performance. We do not know if all the underpinnings affect in the same way NVs' performance. Possibly, given the early stages of development of NVs some of the underpinnings may stand out from the rest. We are sure this distinction is essential for further research.

Finally, DMCs are expected to be crucial under conditions of change, yet we do not know how variations in the level of change experimented in the firm environment affect the role played by the three DMCs underpinnings for NV performance.

# CHAPTER 3: Population, sample and data

## 3.1 Population

### 3.1.1 The context of AIM

AIM is a successful growth market which belongs to the main Stock Market of London. Since its launch in 1995, over 3.500 companies have entered AIM. Helping smaller and growing companies to raise the capital they need for expansion is one of the main goals of AIM.

In our context, AIM implies a rich database of faster growing ventures that need capital for their expansion. Companies listed in AIM provide admission documents and annual reports which are available on the AIM Website.

We annually extracted information from annual reports, such as the composition of the Board and the TMT, the role and background of the executives and non-executives, ownership, and details about the origin of the company (Admission Letter).

**Table 3.1. Companies that entered AIM from 1995 to 2015**

| Year | Total number of companies |
|---|---|
| 1995 | 121 |
| 1996 | 142 |
| 1997 | 105 |
| 1998 | 75 |
| 1999 | 102 |
| 2000 | 277 |
| 2001 | 177 |
| 2002 | 160 |
| 2003 | 162 |
| 2004 | 355 |
| 2005 | 519 |
| 2006 | 462 |
| 2007 | 284 |
| 2008 | 114 |
| 2009 | 36 |
| 2010 | 102 |
| 2011 | 90 |
| 2012 | 73 |
| 2013 | 99 |
| 2014 | 118 |
| 2015 | 18 |
| **Total** | **3.591** |

In this thesis we focus on new service ventures registered from 2004 to 2010. The first step was choosing those companies that belong to the service sector. For this goal, we took the following steps:

1. We downloaded the list of firms in AIM that were active in April 2013, a total of 1.203 companies.

2. We identified those companies that were registered from 2004 to 2010. We looked up the companies from the AIM file on the Amadeus database because we needed the date of registration and this does not appear in the original file from AIM. We thus ended up with 203 companies. This step allowed us to gather more variables from Amadeus, such as the NACE code, the country, identification numbers (ISIN, SEDOL, BvD (Amadeus identification)), and trade description.

3. We chose the service industry NACE and used the statistical classification of economic activities in the European Community, Rev. 2 (2008). We established that of the 203 companies mentioned above, only 180 belonged to the service industry (from section G or the NACE 45 code).

**Table 3.2. AIM service companies registered from 2004 to 2010**

| NACE 2 DIG | NACE Rev. 2 primary code | Total |
|---|---|---|
| 45 | 4511 | 2 |
| | 4520 | 1 |
| | **Total 45** | **3** |
| 46 | 4614 | 1 |
| | 4642 | 1 |
| | 4646 | 1 |
| | 4651 | 1 |
| | 4671 | 1 |
| | **Total 46** | **5** |
| 47 | 4722 | 1 |
| | 4753 | 1 |
| | 4799 | 1 |
| | **Total 47** | **3** |
| 49 | 4931 | 1 |
| | 4941 | 1 |
| | **Total 49** | **2** |
| 51 | 5110 | 1 |

| NACE 2 DIG | NACE Rev. 2 primary code | Total |
|---|---|---|
| | **Total 51** | **1** |
| 52 | 5222 | 1 |
| | 5229 | 1 |
| | **Total 52** | **2** |
| 56 | 5610 | 2 |
| | **Total 56** | **2** |
| 59 | 5911 | 4 |
| | 5913 | 1 |
| | 5920 | 1 |
| | **Total 59** | **6** |
| 61 | 6120 | 2 |
| | 6130 | 1 |
| | 6190 | 6 |
| | **Total 61** | **9** |
| 62 | 6201 | 3 |
| | 6202 | 9 |
| | 6209 | 7 |
| | **Total 62** | **19** |
| 63 | 6311 | 1 |
| | **Total 63** | **1** |
| 64 | 6420 | 7 |
| | 6430 | 4 |
| | 6499 | 6 |
| | **Total 64** | **17** |
| 66 | 6612 | 1 |
| | 6619 | 4 |
| | 6630 | 1 |
| | **Total 66** | **6** |
| 68 | 6810 | 1 |
| | 6832 | 1 |
| | **Total 68** | **2** |
| 69 | 6910 | 1 |
| | **Total 69** | **1** |
| 70 | 7010 | 19 |
| | 7021 | 2 |
| | 7022 | 9 |
| | **Total 70** | **30** |
| 71 | 7111 | 3 |
| | 7112 | 7 |
| | **Total 71** | **10** |
| 72 | 7211 | 13 |
| | 7219 | 10 |
| | **Total 72** | **23** |
| 73 | 7311 | 2 |
| | 7312 | 1 |
| | 7320 | 2 |
| | **Total 73** | **5** |

| NACE 2 DIG | NACE Rev. 2 primary code | Total |
|---|---|---|
| 74 | 7490 | 1 |
| | **Total 74** | **1** |
| 75 | 7500 | 1 |
| | **Total 75** | **1** |
| 78 | 7810 | 1 |
| | 7820 | 1 |
| | **Total 78** | **2** |
| 80 | 8010 | 1 |
| | 8020 | 1 |
| | **Total 80** | **2** |
| 81 | 8110 | 2 |
| | 8130 | 1 |
| | **Total 81** | **3** |
| 82 | 8230 | 1 |
| | 8299 | 15 |
| | **Total 82** | **16** |
| 84 | 8411 | 1 |
| | 8422 | 1 |
| | 8425 | 1 |
| | **Total 84** | **3** |
| 85 | 8532 | 1 |
| | 8559 | 1 |
| | **Total 85** | **2** |
| 86 | 8621 | 1 |
| | **Total 86** | **1** |
| 93 | 9311 | 1 |
| | **Total 93** | **1** |
| 96 | 9609 | 1 |
| | **Total 96** | **1** |
| | **Total** | **180** |

4. We selected those companies that took two years to get from registration to entering AIM as we are interested in those companies that entered AIM during their first years of activity because they achieved high performance in their first stage and needed financial resources to keep growing. We thus kept 127 companies in this step.

5. Finally, we chose 126 companies, because one of the 127 selected above had disappeared from Amadeus, the name of that company being H&T GROUP PLC. The data from Amadeus have been crucial in this research and we needed to have the same variables from the same sources for all the companies.

## 3.2 Sample

### 3.2.1 Methodology: How did we extract the sample?

General description: young service ventures which entered AIM (Alternative Investment Market) in their two first years of life.

AIM is the London Stock Exchange's international market for smaller growing companies. A wide range of businesses including early stage, venture capital-backed as well as more established companies join AIM seeking access to growth capital.

When we downloaded the list of all the AIM companies from the AIM website in April 2013, more than 1.000 companies were included. The first challenge was finding their dates of registration and we found them by crossing the AIM list with the Amadeus database. We were interested in young ventures, so we decided to choose those companies that were registered from 2004 to 2010. The second step was selecting the industry by its NACE code. We kept only those companies with a NACE service code (from the NACE 45 code following the Eurostat classification).

Finally, we considered it an important rule to select those companies that entered AIM in their two first years of life. Firstly, because this supplied us with a setting of fast growing young firms which needed financial resources to continue growing. Secondly, annual reports produced by the companies were one of the most important sources of information for our research, and they are not available if the company does not enter AIM. We consider 2 years to be a reasonable bias.

The size of the final sample was 126 new service ventures that entered AIM in the first two years of activity. We considered seven cohorts of firms registered in: 2004 (42), 2005 (29), 2006 (28), 2007 (9), 2008 (4), 2009 (6) and 2010 (8). All of them were analysed from their date of registration to 2013. The final sample included a total of 1.029 observations from 126 firms.

We split the information into two levels: Board and Top Management Team (TMT). As a general rule, we considered board level to be executives and non-executives within the board section of the annual reports, and TMT to be only executive members.

The longitudinal data on both executive and non-executive directors were gathered from AIMS' annual reports' board section and completed by information from Amadeus, LexisNexis, professional social networks such as LinkedIn, and economic webpages such as Bloomberg and Zoom Info.

Annual reports provided the information about the composition of boards/TMTs for each year, and then we linked each member to his or her ID number from Amadeus. Educational and professional background variables were gathered from the following sources: the brief curriculum description included in the board section of annual reports; the personal profile from Amadeus; information published on social networks such as LinkedIn; the 'our team' section on company websites; news databases such as LexisNexis; and economic webpages such as Bloomerg and Zoom Info.

For the purpose of dating the professional experience of each director, we represent each experience profile as a row in an excel file. In this way, through the date of appointment and resignation we know the directors' professional time line, job title, type of position, body or department and company characteristics such as sector, country, size, and so forth.

Data on firm performance, size and environmental dynamism were compiled from Amadeus.

### 3.2.2 Description of the companies

Our 126 companies are the following:

**Table 3.3. List of firms**

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 1 | 1PM PLC | 2006 | 2006 | GB00BCDBXK43 |
| 2 | ACM SHIPPING | 2006 | 2006 | GB00B1GJ9M21 |
| 3 | ADVANCED COMPUTER | 2006 | 2008 | GB00B1G58016 |
| 4 | AFC ENERGY | 2006 | 2007 | GB00B18S7B29 |
| 5 | AVANTI COMMUNICATION | 2007 | 2007 | GB00B1VCNQ84 |
| 6 | BP MARSH | 2006 | 2006 | GB00B0XLRJ79 |
| 7 | BGLOBAL PUBLIC | 2006 | 2007 | GB00B1VLV059 |
| 8 | BLINKX | 2007 | 2007 | GB00B1WBW239 |
| 9 | BRAINJUICER | 2006 | 2006 | GB00B1GVQH21 |
| 10 | BRIGHT SIDE GROUP | 2006 | 2008 | GB00B1L7MY49 |

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 11 | CAPITAL LEASE | 2007 | 2007 | GB00B1Z7WX97 |
| 12 | COHORT PLC | 2006 | 2006 | GB00B0YD2B94 |
| 13 | CONNEMARA MINING | 2006 | 2007 | IE00B2357X72 |
| 14 | CASTLE STREET INVESTMENTS PLC | 2009 | 2010 | GB00B4NJ4984 |
| 15 | CVS GROUP | 2007 | 2007 | GB00B2863827 |
| 16 | DIGITAL BARRIERS | 2010 | 2010 | GB00B627R876 |
| 17 | DP POLAND | 2010 | 2010 | GB00B3Q74M51 |
| 18 | EMIS GROUP | 2008 | 2010 | GB00B61D1Y04 |
| 19 | FLOWGROUP | 2006 | 2006 | GB00B19H7076 |
| 20 | EPISTEM HOLDING | 2007 | 2007 | GB00B1VKB244 |
| 21 | ESSENDEN | 2009 | 2009 | GB00B64FXD65 |
| 22 | GAMA AVIATION PLC | 2010 | 2010 | GB00B3ZP1526 |
| 23 | ILIKA PLC | 2010 | 2010 | GB00B608Z994 |
| 24 | IMPELLAM GROUP | 2008 | 2008 | GB00B8HWGJ55 |
| 25 | IMPERIAL INNOVATION | 2006 | 2006 | GB00B170L953 |
| 26 | LEARNING TECHNOLOGIES GROUP PLC | 2010 | 2011 | GB00B4T7HX10 |
| 27 | INSTEM PLC | 2010 | 2010 | GB00B3TQCK30 |
| 28 | INVU | 2007 | 2007 | GB00B28Y2K12 |
| 29 | JAYWING | 2006 | 2006 | GB00B1FPT107 |
| 30 | KENNEDY VENTURES | 2006 | 2006 | GB00B830HW33 |
| 31 | PROXAMA | 2007 | 2008 | GB00B2PKZ581 |
| 32 | MONITISE | 2006 | 2007 | GB00B1YMRB82 |
| 33 | NBNK INVESTMENTS | 2010 | 2010 | GB00B58GVN47 |
| 34 | NORTH RIVER | 2006 | 2006 | GB00B3XGRQ09 |
| 35 | NORTHERN BEAR | 2006 | 2006 | GB00B19FLM15 |
| 36 | OXFORD ADVANCED | 2006 | 2007 | GB00B29YYY86 |
| 37 | OXFORD CATALYST | 2006 | 2008 | GB00B11SZ269 |
| 38 | OXFORD PHARMA | 2009 | 2010 | GB00B3LXPB43 |
| 39 | PEERTV | 2009 | 2011 | GB00BYZ9Z481 |
| 40 | PLUTUS RESOURCES | 2006 | 2007 | GB00B1GDWB47 |

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 41 | POWERFLUTE | 2006 | 2007 | FI0009015291 |
| 42 | PROACTIS HOLDINGS | 2006 | 2006 | GB00B13GSS58 |
| 43 | PROTON POWER | 2006 | 2006 | GB00B140Y116 |
| 44 | SCIENCE GROUP PLC | 2008 | 2008 | GB00B39GTJ17 |
| 45 | SCANCELL | 2008 | 2010 | GB00B63D3314 |
| 46 | SILVERDELL | 2006 | 2006 | GB00B12XK814 |
| 47 | SMART METERING | 2009 | 2011 | GB00B4X1RC86 |
| 48 | SNACKTIME | 2007 | 2007 | GB00B29HFH73 |
| 49 | STRATEGIC MINERALS | 2010 | 2011 | GB00B4W8PD74 |
| 50 | TASTY | 2006 | 2006 | GB00B17MN067 |
| 51 | MISSION MARKETING | 2006 | 2006 | GB00B11FD453 |
| 52 | TVC HOLDINGS | 2007 | 2007 | IE00B1Z90V93 |
| 53 | VERTU MOTORS | 2006 | 2007 | GB00B1GK4645 |
| 54 | VOLGA GAS | 2006 | 2007 | GB00B1VN4809 |
| 55 | HUME CAPITAL SECURITIES | 2009 | 2010 | GB00B3WHZR16 |
| 56 | ACTIVE RISK GROUP | 2005 | 2005 | GB00B09VL770 |
| 57 | ADVANCED ONCOTHERAPY | 2005 | 2006 | GB00B16JQ761 |
| 58 | MY-PAY GROUP PLC | 2005 | 2005 | GB00B0N59376 |
| 59 | ALPHA STRATEGIC | 2005 | 2005 | GB00B0CZZR45 |
| 60 | ARMSTRONG VENTURES | 2005 | 2006 | GB00B1FJP363 |
| 61 | ASHCOURT ROWAN | 2005 | 2005 | GB00B6540P35 |
| 62 | BANGO | 2005 | 2005 | GB00B0BRN552 |
| 63 | CELLCAST | 2005 | 2005 | GB00B0GWFM68 |
| 64 | COMS PLC | 2005 | 2006 | GB00B3CDXQ41 |
| 65 | CONCHA PLC | 2005 | 2005 | GB00B8Y82097 |
| 66 | EREDENE CAPITAL | 2005 | 2006 | GB00B064S565 |
| 67 | EMMIT PLC | 2005 | 2005 | GB00BFN09H12 |
| 68 | EVOCUTIS | 2005 | 2006 | GB00B4WKYH05 |
| 69 | GLOBO | 2005 | 2007 | GB00B282VW04 |
| 70 | HYDROGEN GROUP | 2005 | 2006 | GB00B1DJTV45 |

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 71 | INDEPENDENT RESOURCES | 2005 | 2005 | GB00B0RNX796 |
| 72 | INTANDEM FILMS PLC | 2005 | 2005 | GB00B0727R49 |
| 73 | LUDORUM PLC | 2005 | 2006 | GB00B0ZH1L34 |
| 74 | NASSTAR | 2005 | 2005 | GB00B0T1S097 |
| 75 | PANTHEON RESOURCES | 2005 | 2006 | GB00B125SX82 |
| 76 | PETRONEFT | 2005 | 2006 | IE00B0Q82B24 |
| 77 | PLANT IMPACT | 2005 | 2006 | GB00B1F4K366 |
| 78 | PLETHORA SOLUTIONS | 2005 | 2005 | GB00B06GL868 |
| 79 | RENEURON GROUP PLC | 2005 | 2005 | GB00B0DZML60 |
| 80 | ROTALA PLC | 2005 | 2005 | GB00B1Z2MP60 |
| 81 | SOFTWARE RADIO | 2005 | 2005 | GB00B0M8KM36 |
| 82 | SPDI SECURE | 2005 | 2007 | CY0102102213 |
| 83 | REACT GROUP PLC | 2005 | 2005 | GB00BZ2JBG28 |
| 84 | VERONA PHARMA | 2005 | 2006 | GB00B06GSH43 |
| 85 | MXC CAPITAL LIMITED | 2004 | 2004 | GB0034312214 |
| 86 | REAL ESTATE INVESTORS PLC | 2004 | 2004 | GB00B45XLP34 |
| 87 | TAVISTOCK INVESTMENTS PLC | 2004 | 2004 | GB00BLNMLS43 |
| 88 | INSPIRIT ENERGY HOLDINGS PLC | 2004 | 2006 | GB00B44W9L31 |
| 89 | AMINO TECHNOLOGIES PLC | 2004 | 2004 | GB00B013SN63 |
| 90 | PROVEXIS PLC | 2004 | 2005 | GB00B0923P27 |
| 91 | JARVIS SECURITIES PLC | 2004 | 2004 | GB00B013J330 |
| 92 | REGENERSIS PLC | 2004 | 2005 | GB00B06GNN57 |
| 93 | M&C SAATCHI PLC | 2004 | 2004 | GB00B01F7T14 |
| 94 | PLANT HEALTH CARE PLC | 2004 | 2004 | GB00B01JC540 |
| 95 | BEGBIES TRAYNOR GROUP PLC | 2004 | 2004 | GB00B0305S97 |
| 96 | CELLO GROUP PLC | 2004 | 2004 | GB00B0310763 |
| 97 | CRAVEN HOUSE CAPITAL PLC | 2004 | 2004 | GB00B01TVW49 |
| 98 | MOBILE TORNADO GROUP PLC | 2004 | 2006 | GB00B01RQV23 |

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 99 | SERVISION PLC | 2004 | 2004 | GB00B0586C20 |
| 100 | IMMUNODIAGNOSTIC SYSTEMS HOLDINGS PLC | 2004 | 2004 | GB00B01YZ052 |
| 101 | SAREUM HOLDINGS PLC | 2004 | 2004 | GB00B02RFS12 |
| 102 | MEDIAZEST PLC | 2004 | 2005 | GB00B064NT52 |
| 103 | ACTA S.P.A. | 2004 | 2005 | IT0003891444 |
| 104 | RESTORE PLC | 2004 | 2005 | GB00B5NR1S72 |
| 105 | BLUE STAR CAPITAL PLC | 2004 | 2004 | GB00B02SSZ25 |
| 106 | CERES POWER HOLDINGS PLC | 2004 | 2004 | GB00B0351429 |
| 107 | AEC EDUCATION PLC | 2004 | 2004 | GB00B04XB679 |
| 108 | ALTITUDE GROUP PLC | 2004 | 2005 | GB00B0LSFV82 |
| 109 | SUMMIT THERAPEUTICS PLC | 2004 | 2004 | GB00BN40HZ01 |
| 110 | MESSAGING INTERNATIONAL PLC | 2004 | 2005 | GB00B0DR6985 |
| 111 | CENKOS SECURITIES PLC | 2004 | 2006 | GB00B1FLHR07 |
| 112 | ALPHA RETURNS GROUP PLC | 2004 | 2004 | GB00B7FD9168 |
| 113 | AMEDEO RESOURCES PLC | 2004 | 2004 | GB00BZ0XVY42 |
| 114 | SYNAIRGEN PLC | 2004 | 2004 | GB00B0381Z20 |
| 115 | EMED MINING PUBLIC LIMITED | 2004 | 2005 | CY0106002112 |
| 116 | RARE EARTH MINERALS PLC | 2004 | 2006 | GB00B067JC96 |
| 117 | ASCENT RESOURCES PLC | 2004 | 2004 | GB00B03W6Y84 |
| 118 | HASGROVE LIMITED | 2004 | 2006 | GB00B1FRDB45 |
| 119 | PINNACLE TECHNOLOGY GROUP PLC | 2004 | 2006 | GB00B8GRBX01 |
| 120 | QUADRISE FUELS INTERNATIONAL PLC | 2004 | 2006 | GB00B11DDB67 |
| 121 | STAFFLINE GROUP PLC | 2004 | 2004 | GB00B040L800 |
| 122 | FUSION IP PLC | 2004 | 2005 | GB00B05L5X50 |
| 123 | RED LEOPARD HOLDINGS PLC | 2004 | 2005 | GB00B4JXWP66 |
| 124 | TELIT COMMUNICATIONS PLC | 2004 | 2005 | GB00B06GM726 |
| 125 | UNITED CARPETS GROUP PLC | 2004 | 2005 | GB00B05J4D26 |

| Nº of company | Name of Company | Year of registration | Year of admission into AIM | ISIN number |
|---|---|---|---|---|
| 126 | TOWER RESOURCES PLC | 2004 | 2006 | GB00B05KQ069 |

We have kept 126 new service ventures that were registered between 2004 and 2013 and entered AIM in their first two years of activity. Most of them are English companies (94,44%).

**Table 3.4. Companies' countries of origin**

| Country | Frequency | % |
|---|---|---|
| Cyprus | 2 | 1,59% |
| Finland | 1 | 0,79% |
| Ireland | 3 | 2,38% |
| Italy | 1 | 0,79% |
| United Kingdom | 119 | 94,44% |
| **Total** | **126** | **100,00%** |

From Cyprus are the companies SPDI Secure Property Development & Investment PLC (nº 82) and Emed Mining Public Limited (nº 115). Secure Property was registered in 2005 and entered AIM in 2007. The firm's strategy is centred on generating investment returns principally derived from the operation of income-generating commercial properties and from capital appreciation through investment in high yield real estate assets. The company headquarters are in Cyprus and the subsidiaries are in the Ukraine, Romania and Bulgaria. Emed Mining was registered in 2004 and entered AIM in 2005. Its current name is Atalaya Mining, which is a new European copper producer with Proyecto Riotinto as its main asset.

From Finland we have Powerflute (41). It is a paper and packaging group which seeks to acquire businesses with strong fundamentals whose performance can be improved through a combination of management focus and targeted investment. Powerflute has invested in a number of specialist paper and packaging businesses with a leading position in their markets, selling and distributing products on a worldwide basis. The main businesses of the group are the following: Corenso, a leading international manufacturer of high performance core board and cores, with core board mills in the

United States and Europe and a network of core producing facilities in Europe, North America and China; Powerflute is one of only three producers of premium grade semi-chemical fluting that is used in the manufacture of corrugated board for demanding packaging applications or harsh environmental conditions; and Harvestia is a wood supply company that organizes the procurement, harvesting and delivery of wood and other forest products to users in the paper, sawmill, energy and biofuel sectors.

The three Irish companies are Connemara Mining (13), TVC Holdings (52) and PetroNef (76). The first one, Connemara Mining, was established in 2004 by veterans of the Irish mining industry to exploit zinc and gold opportunities, and entered AIM one year later. It currently holds 35 prospecting licenses in Ireland. TVC Holdings was registered in 2007 and entered AIM in the same year. The company's objective is to achieve capital appreciation through working actively with its current portfolio of investments in quoted and unquoted companies in order to maximize their value and also through identifying new investment opportunities across a range of business sectors, principally in Ireland and the UK. On 28 July 2014, the Company cancelled the admission to trading of its ordinary shares on AIM and ESM. PetroNef was registered in 2005 and entered AIM in 2006. It was established to develop oil assets in Tomsk Oblast in Western Siberia. The board of PetroNeft is made up of highly experienced professionals in the international and Russian oil exploration and development business. The Russian management team has extensive local knowledge of and experience in the exploration and development of oil and gas fields in Tomsk Oblast.

Finally, from Italy, ACTA SPA (103) was founded in 2004 by Paolo Bert and entered AIM one year later in 2005. ACTA's mission is to provide commercially viable onsite hydrogen production systems to accelerate the growth of the hydrogen economy. The company has Mr. Bert as CEO and Robert Drummond as Chairman. Mr. Bert is a successful entrepreneur, and since 2000 he has focused his interest on renewable energy and waste water treatment. He has filed more than twenty-five patents. Mr. Drummond has a successful career in venture capital and is very experienced in guiding young companies through their early phases of growth.

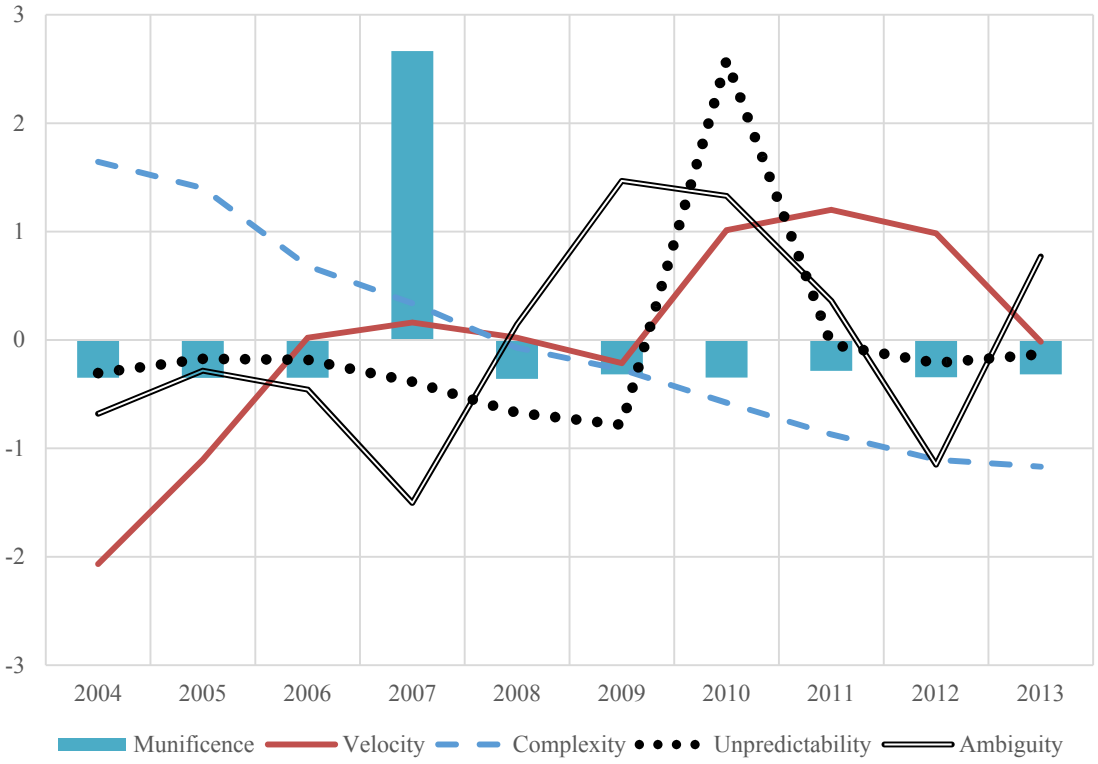
### 3.2.3 Environmental description

We have a multi-sectorial and longitudinal sample. Moreover, we must consider a crisis period from 2008. Thus, the analysis of the environment is a key issue, which can affect the performance of our companies.

The external environmental level involves different environmental dynamism dimensions having unique effects on performance (Davis, Eisenhardt, and Bingham, 2009). It is a multi-dimensional construct which includes the following elements: velocity, complexity, ambiguity and unpredictability. Velocity is the speed or rate at which new opportunities emerge (Eisenhardt, 1989). Complexity is defined as the number of opportunity contingencies that must be successfully addressed (Davis, Eisenhardt, and Bingham, 2009). Complexity increases the difficulty of capturing opportunities because organizations have less latitude for errors when there are numerous, relevant contingencies (Gavetti, Levinthal, and Rivkin, 2005). Furthermore, environmental complexity has been conceptualized as "the heterogeneity of a range of an organization's activities" (Child, 1972; Dess and Beard, 1984). Complexity is operationalized as the mean of the NACE codes in which firms operate. Ambiguity implies lack of clarity, to such an extent that it is difficult to interpret or distinguish opportunities (March and Olsen, 1976). Unpredictability means disorder or turbulence, to such an extent that there is no consistent pattern of opportunities (Davis, Eisenhardt, and Bingham, 2009).

On the other hand, munificence, the abundance of resources, is a key contingency variable (Starbuck, 1973). Not all environments have the same level of resources or munificence. This fact has an influence on the strategic decisions and performance of the firms (Castrogiovanni, 1991). For instance, less munificent environments support the use of complex external social relationships by organizations (Hirsch, 1975). Munificence is calculated as a sales growth rate that represents the percentage change in industry sales from the previous year. Figure 3.1. shows us the trend of each environment's dimensions by year.

**Figure 3.1. The dynamism environment's components (velocity, complexity, ambiguity and unpredictability) and munificence by year**




### 3.2.4 Industry description

In spite of only considering service firms, our sample is multi-sectorial. We have a mean of 47 NACE codes taken from all the periods in the sample. Figure 3.2. shows the number of NACE codes by year.

As Figure 3.2. shows, there is a large number of NACE codes by year. This fact hinders the categorical analysis by industry.

If we only consider the two first digits of NACE classification, we have a total of 31 codes. Figure 3.3. shows us the frequency distribution of the 126 firms by two-digit NACE codes.

**Figure 3.2. NACE codes by year**

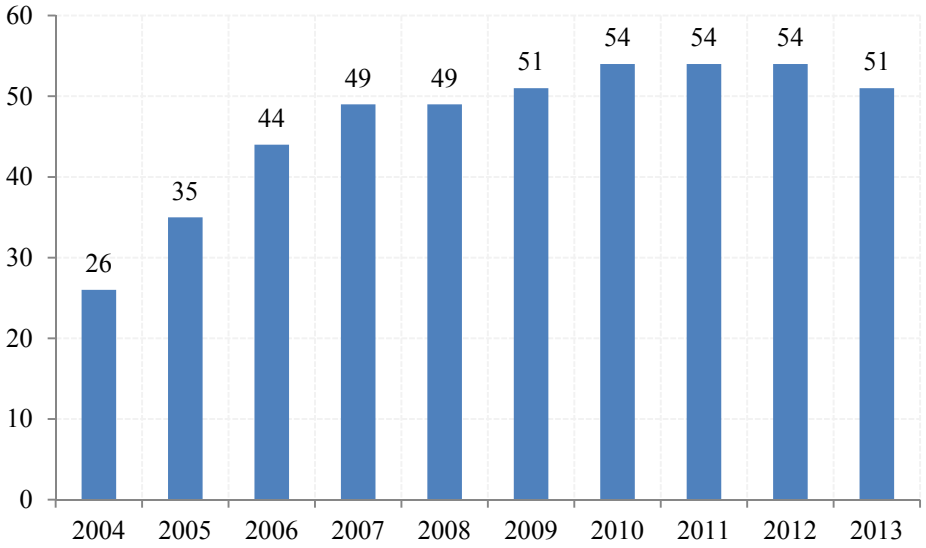
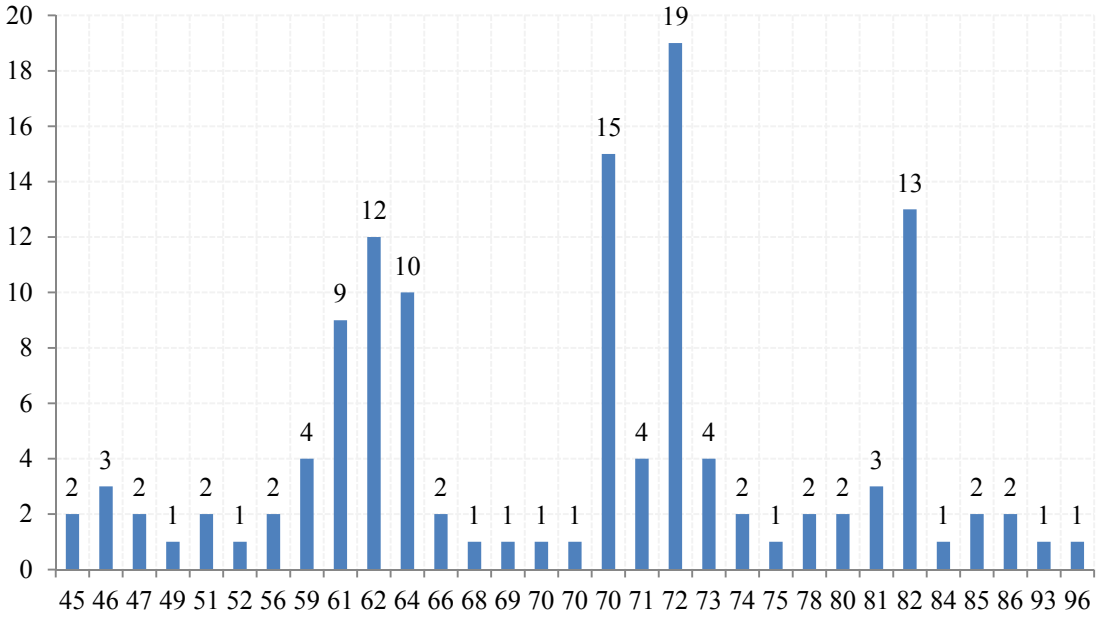



**Figure 3.3. NACE two-digit distribution of frequency**




In order to homogenize the sample and summarize the information, we use Reference and Management of Nomenclatures (RAMON) from Eurostat. Following this system, Table 3.5. shows us the activities found.

**Table 3.5. Reference and management of NACE code nomenclatures**

| NACE code nomenclatures | Nº of companies |
|---|---|
| B - Mining and quarrying | 2 |
| G - Wholesale and retail trade; repair of motor vehicles and motorcycles | 7 |
| H - Transportation and storage | 1 |
| I - Accomodation and food service activities | 2 |
| J - Information and communication | 23 |
| K - Financial and insurance activities | 12 |
| L - Real estate activities | 2 |
| M - Professional, scientific and technical activities | 52 |
| N - Administrative and support service activities | 19 |
| O - Public administration and defence; compulsory social security | 1 |
| P - Education | 2 |
| Q - Human health and social work activities | 1 |
| R - Arts, entertainment and recreation | 1 |
| S - Other service activities | 1 |
| **Total** | **126** |

Figure 3.4. shows the frequency distribution of NACE code nomenclatures in our sample firms. The most of the companies in our sample belong to group M, which involves professional, scientific and technical activities (41,27%).

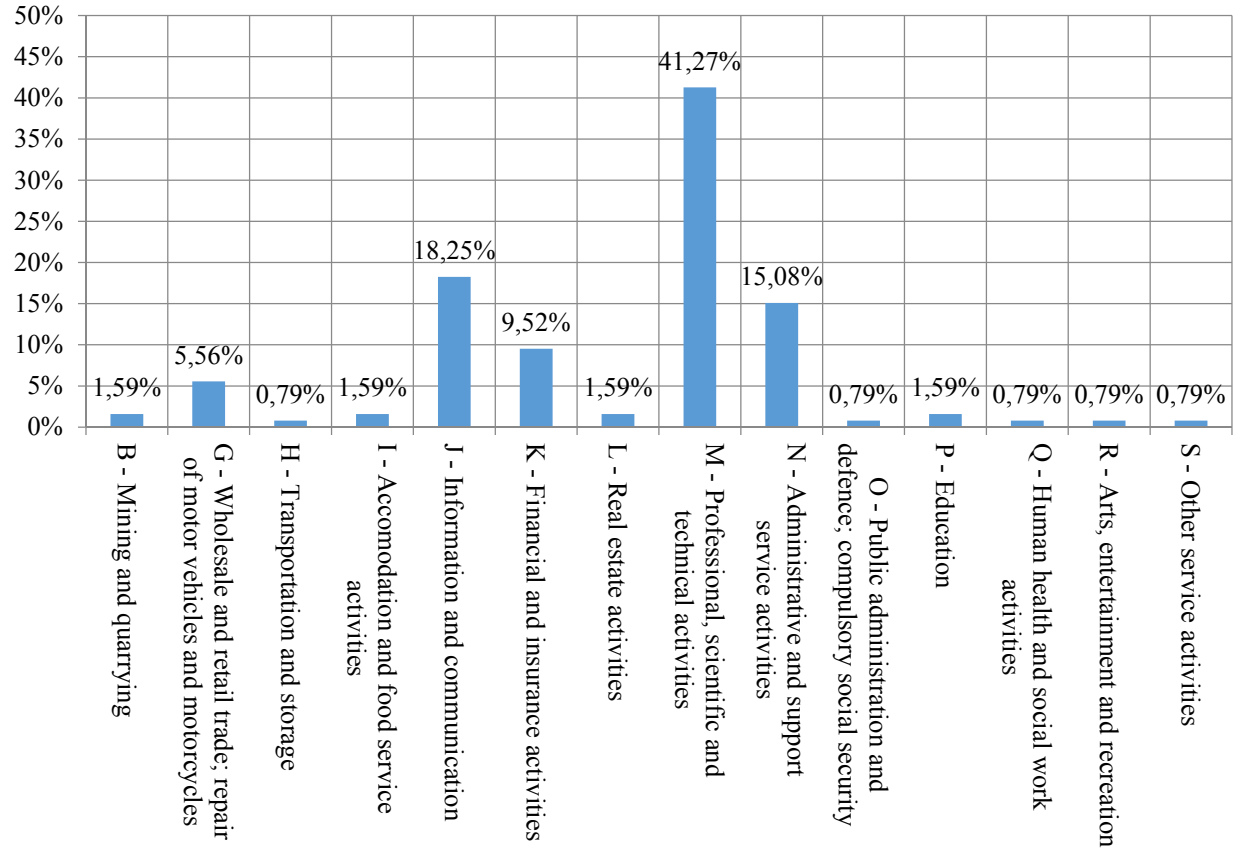
## 3.3 Data on the companies

### 3.3.1 Origins

In spite of them all being new service firms, their origins are diverse, although we have found similarities among these different origins. Four coders (two researchers and two students writing their final degree project) achieved 90% of internal agreement through the following classification:

One of the main distinctions among different NVs is their origin. Origin indicates whether a venture is sponsored by a corporation (corporate venture) or one or more individual entrepreneurs (independent venture). The two types often possess different resources and capabilities which, in turn, may lead to significant variations in their strategic choices and subsequent performance (Zahra, 1996).

**Figure 3.4. Different NACE code nomenclatures in the sample**




We consider the following to be independent ventures:

- De Novo: these are companies that completely independent. One or several entrepreneurs begin a new venture without corporate support.

- Spin-Off: corporate or university.
    - Corporate Spin-Off: they are also known as a *spin-out* or a *starburst*, and this refers to a type of corporate action where a company "splits off" sections to make them separate businesses. They are registered with a new ISIN number and/or new name.
    - University Spin-Off: the main goal of these companies is to transform technological inventions developed from university research that are otherwise likely to remain unexploited.

We consider the following to be corporate ventures:

- Corporate Venture Diversified: when an established company launches a new and different business with the support of the company but with a new ISIN number and/or new name.
- Corporate Venture Not Diversified: when an established company launches a similar business with the support of the company but with a new ISIN number and/or new name.
- Management Buy-In (MBI): a corporate action in which an outside manager or management team purchases an ownership stake in the first company and replaces the existing management team (Bruining and Wright, 2002).
- Management Buy-Out (MBO): implies a transaction where a company's management team purchases the assets and operations of the business they manage (Wright, Thompson, and Robbie, 1992).

Based on a higher classification level, we consider origin to be a dichotomy variable where 1 is if the company is completely independent (the De Novo and Spin-Off categories), and 0 if the company is supported by a corporation (a corporate firm). Tables 3.6., 3.7. y 3.8. show us the distribution of the sample by origin.

**Table 3.6. Origin of the companies: independent and corporate ventures**

| Origin | Frequency | % |
|---|---|---|
| Independent | 54 | 42,86% |
| Corporate | 72 | 57,14% |
| **Total** | **126** | **100%** |

**Table 3.7. Subcategories of the origin of the companies: independent NVs**

| Independent NVs | Frequency | % |
|---|---|---|
| De Novo | 38 | 70,37% |
| University Spin-Off | 13 | 24,07% |
| Corporate Spin-Off | 3 | 5,56% |
| **Total** | **54** | **42,86%** |

**Table 3.8. Subcategories of the origin of the companies: corporate NVs**

| Corporate NVs | Frequency | % |
|---|---|---|
| CV Not Diversified | 33 | 45,83% |
| CV Diversified | 16 | 22,22% |
| Management Buy-Out | 13 | 18,06% |
| Management Buy-In | 10 | 13,89% |
| **Total** | **72** | **100%** |

**Figure 3.5. Origin of the companies: all categories**

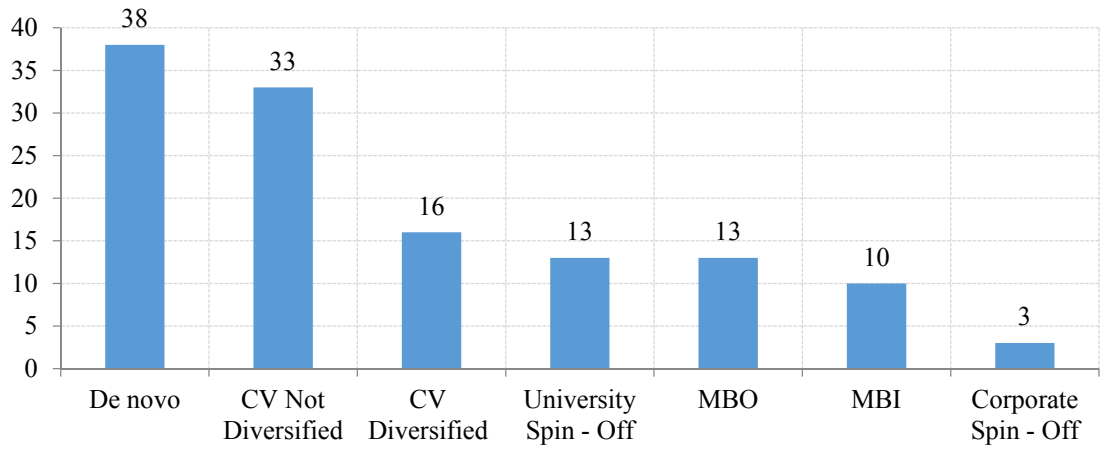
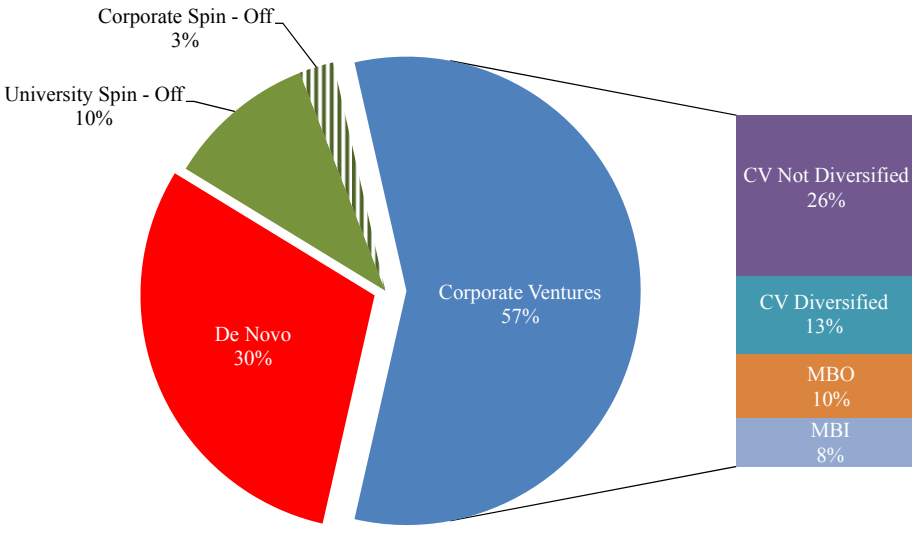



**Figure 3.6. Origin of the companies: independent and corporate ventures**



Based on the latest figures, the De Novo category is the most frequent. However, independent new ventures do not make up the majority of the sample. As Figure 3.6. shows, 57% of our sample consists of corporate ventures, and within this category not-diversified companies have the highest frequency (45,83% of corporate ventures and 26% of the total of 126 companies in the sample).

### 3.3.2 Firm size

The size of the firms has been worked out based on the number of employees. Research suggests that size can affect performance outcomes (Zajac, Kraatz, and Bresser, 2000).

The mean size of our sample is 359,7 employees. We have a population of small and medium new ventures of a wide range of sizes. For later analysis, we use standardized measurement in order to reduce the bias from dispersion.

**Table 3.9. Size of the firms (nº of employees)**

| Period | Nº of companies | Mean (nº of employees) | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 109 | 593,9 | 3.632,1 | 28.674 | 1 | 28.673 |
| 1 | 125 | 424,2 | 2.837,7 | 28.506 | 3 | 28.503 |
| 2 | 126 | 379,5 | 2.316,1 | 24.669 | 3 | 24.666 |
| 3 | 126 | 457,9 | 2.798,0 | 30.087 | 2 | 30.085 |
| 4 | 117 | 483,6 | 2.820,0 | 29.737 | 2 | 29.735 |
| 5 | 112 | 251,6 | 495,1 | 2.822 | 1 | 2.821 |
| 6 | 108 | 237,4 | 487,1 | 3.059 | 1 | 3.058 |
| 7 | 98 | 256,0 | 540,6 | 3.488 | 2 | 3.486 |
| 8 | 70 | 182,5 | 399,3 | 2.401 | 1 | 2.400 |
| 9 | 38 | 261,5 | 547,0 | 2.681 | 2 | 2.679 |
| **Total** | **126** | **359,7** | **2.141,4** | **30.087** | **1** | **30.086** |

### 3.3.3 The board

We consider all executive and non-executive directors named in the board section of annual reports to be board members. The mean size of the board is six members, of which 50% are executive and 50% are non-executive directors.

**Table 3.10. Board composition**

| Age of firm | Nº of companies | Mean size of board | SD | Max | Min | Range | % Non-exe. | % Exe. |
|---|---|---|---|---|---|---|---|---|
| 0 | 109 | 5 | 1,8 | 9 | 1 | 8 | 45,2% | 54,8% |
| 1 | 125 | 5 | 1,7 | 9 | 1 | 8 | 45,8% | 54,2% |
| 2 | 126 | 6 | 1,8 | 10 | 2 | 8 | 49,3% | 50,7% |
| 3 | 126 | 6 | 1,7 | 11 | 2 | 9 | 50,2% | 49,8% |
| 4 | 117 | 6 | 1,6 | 11 | 2 | 9 | 50,3% | 49,7% |
| 5 | 112 | 6 | 2,0 | 15 | 2 | 13 | 51,1% | 48,9% |
| 6 | 108 | 6 | 2,4 | 18 | 2 | 16 | 51,4% | 48,6% |
| 7 | 98 | 6 | 2,5 | 20 | 2 | 18 | 51,7% | 48,3% |
| 8 | 70 | 6 | 2,2 | 12 | 2 | 10 | 54,2% | 45,8% |
| 9 | 38 | 6 | 1,6 | 10 | 3 | 7 | 56,2% | 43,8% |
| **Total** | **126** | **6** | **2,0** | **20** | **1** | **19** | **50,0%** | **50,0%** |

**Nº of functional areas in the board**

We gathered the number of functional areas covered by the board according to the following classification system: 1. Research and development, 2. Manufacturing and operations, 3. Marketing and sales, and 4. Finance, accounting, legal and administrative (Boeker and Wiltbank, 2005). Table 3.11 shows us that in the majority of the cases only one functional area is covered by the board, which is usually 4. Finance, accounting, legal, and administrative. As the companies progress, more and more of them suffer changes in the composition of the board.

**Table 3.11. Functional areas of the board**

| Age of firm | Nº of companies | Nº of func. areas | Max func. areas | Min func. areas | % Companies suffering change in the board |
|---|---|---|---|---|---|
| 0 | 109 | 1,5 | 4 | 1 | 0,0% |
| 1 | 125 | 1,6 | 4 | 1 | 52,0% |
| 2 | 126 | 1,6 | 3 | 1 | 61,1% |
| 3 | 126 | 1,5 | 4 | 1 | 69,0% |
| 4 | 117 | 1,6 | 4 | 1 | 53,8% |
| 5 | 112 | 1,5 | 3 | 1 | 60,4% |
| 6 | 108 | 1,5 | 3 | 1 | 67,6% |
| 7 | 98 | 1,5 | 3 | 1 | 67,3% |
| 8 | 70 | 1,5 | 3 | 1 | 65,7% |
| 9 | 38 | 1,4 | 2 | 1 | 65,8% |
| **Total** | **126** | **1,5** | **4** | **1** | **55,4%** |

### 3.3.4 Top Management Team (TMT)

#### 3.3.4.1 Demographic variables

As general rule, we consider all executives named in the board section of the annual report to be members of the TMT

##### 3.3.4.1.1 Size

Table 3.12. shows us some descriptive statistics of TMT composition. In some periods the minimum of executives is zero; these cases are not considered in the analysis.

**Table 3.12. Size of TMT**

| Period | Nº of companies | Mean size of TMT | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 109 | 3 | 1,2 | 6 | 1 | 5 |
| 1 | 125 | 3 | 1,2 | 7 | 1 | 6 |
| 2 | 126 | 3 | 1,2 | 7 | 1 | 6 |
| 3 | 126 | 3 | 1,1 | 7 | 1 | 6 |
| 4 | 117 | 3 | 1,1 | 7 | 1 | 6 |
| 5 | 112 | 3 | 1,4 | 11 | 1 | 10 |
| 6 | 108 | 3 | 1,6 | 14 | 1 | 13 |
| 7 | 98 | 3 | 1,7 | 14 | 1 | 13 |
| 8 | 70 | 3 | 1,1 | 7 | 1 | 6 |
| 9 | 38 | 3 | 1,0 | 5 | 1 | 4 |
| **Total** | **126** | **3** | **1,3** | **14** | **1** | **13** |

##### 3.3.4.1.2 Gender

In general, both boards and TMTs are entirely composed of males (all periods). Taking the activity into account, biotechnological, financial and marketing firms have the highest number of females, with these firms having a mean of 0,3 per team (see Figure 3.8.).

**Figure 3.7. TMT gender by age of the firm**

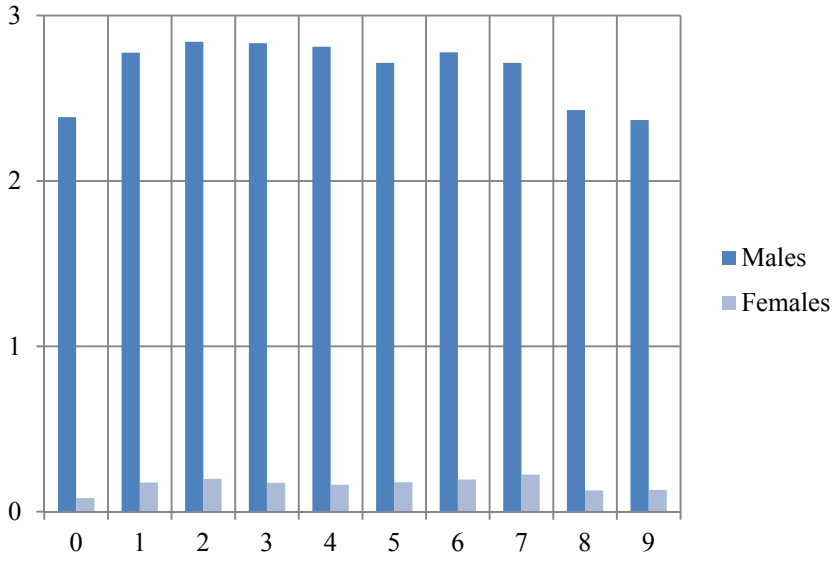
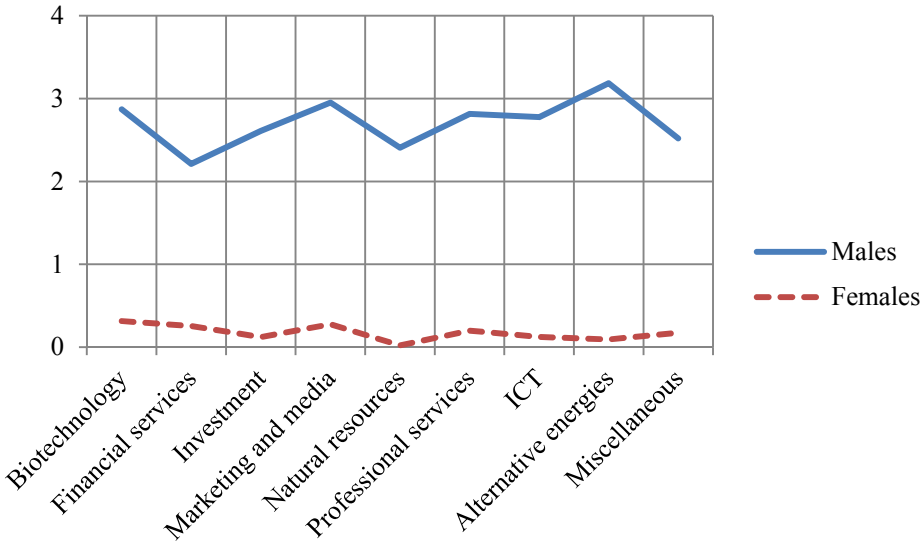



**Figure 3.8. TMT gender by activity**




### 3.3.4.1.3 Age

The mean age of members of the TMT is 48,6 years for all periods. Figure 3.9. shows us the distribution of the age of TMT members according to the age of the firm. In Table 3.13. we can see the differences between the younger and older members of the TMTs. For each period we usually find an age range of at least 30 years.

**Figure 3.9. Mean age of TMT members**

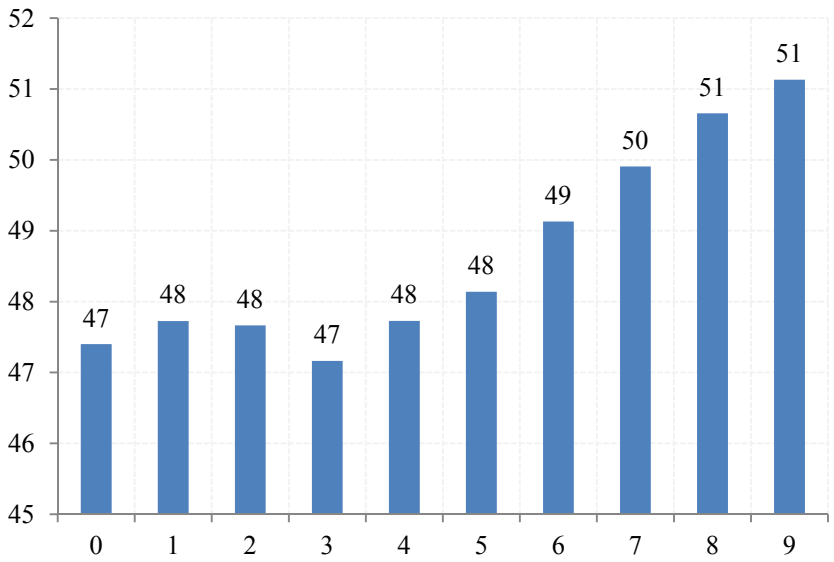



**Table 3.13. Age of TMT members**

| Period | Nº of companies | Size of TMT | Mean age | Max age | Min age | Range |
|---|---|---|---|---|---|---|
| 0 | 109 | 2 | 46 | 69 | 30 | 39 |
| 1 | 125 | 3 | 47 | 66 | 31 | 35 |
| 2 | 126 | 3 | 48 | 62 | 32 | 30 |
| 3 | 126 | 3 | 48 | 63 | 33 | 30 |
| 4 | 117 | 3 | 49 | 65 | 34 | 31 |
| 5 | 112 | 3 | 49 | 66 | 31 | 35 |
| 6 | 108 | 3 | 50 | 67 | 32 | 35 |
| 7 | 98 | 3 | 51 | 68 | 33 | 35 |
| 8 | 70 | 3 | 51 | 71 | 34 | 37 |
| 9 | 38 | 3 | 51 | 72 | 34 | 38 |
| **Total** | **126** | **3** | **49** | **72** | **30** | **42** |

#### 3.3.4.1.4 Ownership

The structure of ownership shows us that most members of the TMT are shareholders in the company with a minimum of 10% of the total number of shares in the firm. The nature of the sample may explain this circumstance. Due to the companies in the sample being young ventures that entered AIM in their first two years of activity, the implication of the TMT is essential.

**Table 3.14. Ownership structure**

| Period | Nº of companies | Size of TMT | Nº of shareholders | % Shares |
|---|---|---|---|---|
| 0 | 109 | 2 | 2 | 13,7% |
| 1 | 125 | 3 | 2 | 17,7% |
| 2 | 126 | 3 | 2 | 17,0% |
| 3 | 126 | 3 | 2 | 15,0% |
| 4 | 117 | 3 | 2 | 13,5% |
| 5 | 112 | 3 | 2 | 11,3% |
| 6 | 108 | 3 | 2 | 10,8% |
| 7 | 98 | 3 | 2 | 10,9% |
| 8 | 70 | 3 | 2 | 9,5% |
| 9 | 38 | 3 | 2 | 12,3% |
| **Total** | **126** | **3** | **2** | **13,5%** |

### 3.3.4.2 Managerial human capital variables

Becker (1964) conceptualized human capital as the knowledge and learned skills that individuals develop through their prior experience, training, and education. Previous research (Gimeno, Folta, Cooper, and Woo, 1997) has operationalized general human capital as years of education, managerial experience and work experience, and specific (industry or firm) human capital as experience of expertise in specific functional areas of the same firm. The breadth and depth of TMTs' directors' experience have been included in terms of the number of companies worked for and the years of working respectively.

#### 3.3.4.2.1 Knowledge

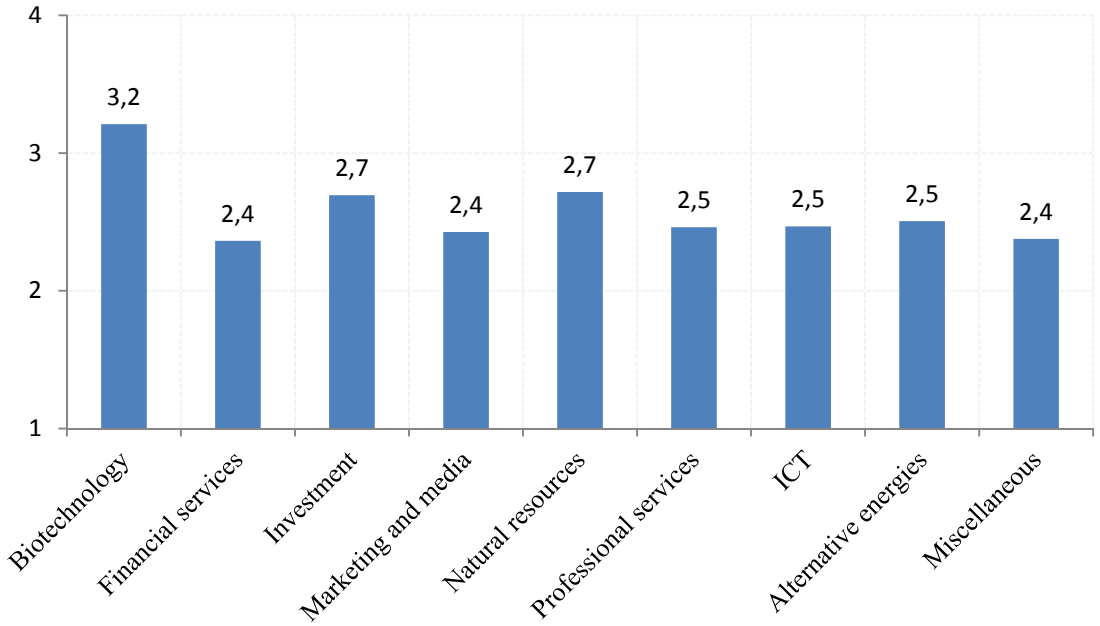
We measure managerial human capital using the following variables of TMT: level of knowledge (1 = no higher/university studies; 2 = higher/university studies, such as bachelor's degree; 3 = master's degree or similar; 4 = PhD); the proportion of members of TMTs with postgraduate studies; and the proportion of members of TMTs with studies linked to functional areas. Table 3.15. shows us descriptive statistics of knowledge variables.

**Table 3.15. Descriptive statistics of knowledge variables**

| Period | Level of knowledge | SD | Max | Min | % with master's degree or PhD | % with studies linked to functional areas |
|---|---|---|---|---|---|---|
| 0 | 2,5 | 0,6 | 4 | 1,0 | 49,2% | 83,0% |
| 1 | 2,6 | 0,5 | 4 | 1,7 | 51,5% | 84,3% |
| 2 | 2,7 | 0,5 | 4 | 1,7 | 56,3% | 85,1% |
| 3 | 2,6 | 0,5 | 4 | 1,5 | 56,4% | 85,0% |
| 4 | 2,6 | 0,6 | 4 | 1,0 | 54,1% | 82,8% |
| 5 | 2,6 | 0,6 | 4 | 1,0 | 52,6% | 82,5% |
| 6 | 2,6 | 0,6 | 4 | 1,0 | 52,2% | 83,4% |
| 7 | 2,6 | 0,6 | 4 | 1,0 | 52,0% | 82,2% |
| 8 | 2,6 | 0,6 | 4 | 1,0 | 55,2% | 82,8% |
| 9 | 2,6 | 0,5 | 4 | 1,0 | 51,7% | 80,0% |
| **Total** | **2,4** | **0,7** | **4** | **1,0** | | |

Figure 3.10. indicates that Biotechnology companies have the TMTs with the highest level of knowledge (3,2), followed by Investment, and Natural resources (2,7).

**Figure 3.10. Level of knowledge by activity**



#### 3.3.4.2.2 Experience: depth and breadth

Two dimensions of experience have been considered in order to measure this variable of human capital: depth and breadth (Haynes and Hillman, 2010). We consider depth of experience to be the mean of the years that TMT members have worked in the same firm, in the same corporate group, and in both the same and different industries. With regard to breadth of experience we consider the number of companies in which TMT members have served (group, industry and other industries).

**Table 3.16. Depth of experience in the same firm**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 0,50 | 0,42 | 3,91 | 0,03 | 3,88 |
| 1 | 1,24 | 0,49 | 4,91 | 0,28 | 4,63 |
| 2 | 1,97 | 0,66 | 5,91 | 0,50 | 5,41 |
| 3 | 2,60 | 0,89 | 6,91 | 0,70 | 6,21 |
| 4 | 3,29 | 1,11 | 7,91 | 0,65 | 7,27 |
| 5 | 3,83 | 1,33 | 8,91 | 0,77 | 8,14 |
| 6 | 4,28 | 1,61 | 9,91 | 0,77 | 9,14 |
| 7 | 4,72 | 1,95 | 10,92 | 0,41 | 10,51 |
| 8 | 5,02 | 2,51 | 11,92 | 0,37 | 11,55 |
| 9 | 4,89 | 2,66 | 9,50 | 0,60 | 8,89 |
| **Total** | **2,98** | **1,99** | **11,92** | **0,03** | **11,89** |

**Table 3.17. Depth of experience in the corporate group**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 2,90 | 4,04 | 23,72 | 0,03 | 23,69 |
| 1 | 3,28 | 3,65 | 24,72 | 0,45 | 24,27 |
| 2 | 3,95 | 3,58 | 25,72 | 0,50 | 25,22 |
| 3 | 4,49 | 3,92 | 26,72 | 0,70 | 26,02 |
| 4 | 4,95 | 3,36 | 27,72 | 1,18 | 26,54 |
| 5 | 5,49 | 3,34 | 28,72 | 0,77 | 27,95 |
| 6 | 6,06 | 3,57 | 29,34 | 1,26 | 28,08 |
| 7 | 6,64 | 4,25 | 33,60 | 0,41 | 33,19 |
| 8 | 6,36 | 4,55 | 34,40 | 0,37 | 34,03 |
| 9 | 6,54 | 6,31 | 39,25 | 0,79 | 38,46 |
| **Total** | **4,85** | **4,10** | **39,25** | **0,03** | **39,22** |

**Table 3.18. Depth of experience in the same industry**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 2,27 | 2,72 | 10,86 | 0,03 | 10,83 |
| 1 | 2,76 | 2,42 | 11,86 | 0,28 | 11,57 |
| 2 | 3,46 | 2,47 | 12,86 | 0,50 | 12,36 |
| 3 | 3,97 | 2,55 | 13,86 | 0,70 | 13,15 |
| 4 | 4,75 | 2,60 | 14,86 | 1,18 | 13,68 |
| 5 | 5,24 | 2,48 | 12,69 | 0,77 | 11,92 |
| 6 | 5,65 | 2,55 | 13,69 | 0,70 | 12,99 |
| 7 | 6,19 | 2,83 | 14,64 | 0,41 | 14,23 |
| 8 | 6,44 | 3,25 | 15,64 | 0,37 | 15,27 |
| 9 | 6,39 | 3,91 | 16,05 | 0,79 | 15,26 |
| **Total** | **4,45** | **3,02** | **16,05** | **0,03** | **16,02** |

**Table 3.19. Depth of experience in other industries**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 6,49 | 4,39 | 27,66 | 0,03 | 27,63 |
| 1 | 6,64 | 4,72 | 28,32 | 0,13 | 28,20 |
| 2 | 6,79 | 4,75 | 29,00 | 0,17 | 28,83 |
| 3 | 7,29 | 5,21 | 29,70 | 0,95 | 28,75 |
| 4 | 7,32 | 4,96 | 30,46 | 0,92 | 29,55 |
| 5 | 7,75 | 5,10 | 31,18 | 0,01 | 31,16 |
| 6 | 8,29 | 5,33 | 29,78 | 0,12 | 29,65 |
| 7 | 8,78 | 5,36 | 31,28 | 0,58 | 30,70 |
| 8 | 8,54 | 4,78 | 32,08 | 0,58 | 31,50 |
| 9 | 9,76 | 7,75 | 37,03 | 0,58 | 36,45 |
| **Total** | **7,56** | **5,18** | **37,03** | **0,01** | **37,02** |

**Table 3.20. Depth of general experience**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 8,85 | 5,21 | 35,05 | 0,06 | 34,99 |
| 1 | 9,46 | 5,42 | 36,71 | 1,25 | 35,47 |
| 2 | 10,29 | 5,60 | 38,24 | 1,80 | 36,44 |
| 3 | 11,28 | 6,22 | 39,78 | 2,00 | 37,78 |
| 4 | 12,02 | 6,23 | 41,37 | 3,27 | 38,11 |
| 5 | 12,93 | 6,29 | 42,92 | 0,78 | 42,14 |
| 6 | 13,89 | 6,36 | 39,82 | 1,93 | 37,89 |
| 7 | 15,04 | 6,82 | 45,92 | 2,33 | 43,58 |
| 8 | 14,91 | 6,76 | 47,72 | 4,45 | 43,27 |
| 9 | 16,15 | 10,27 | 51,64 | 2,98 | 48,66 |
| **Total** | **12,04** | **6,66** | **51,64** | **0,06** | **51,58** |

**Table 3.21. Breadth of experience in the corporate group**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 17,06 | 19,67 | 109,00 | 0,00 | 109,00 |
| 1 | 19,02 | 22,15 | 110,00 | 0,00 | 110,00 |
| 2 | 20,09 | 21,53 | 109,00 | 0,00 | 109,00 |
| 3 | 20,98 | 21,43 | 109,00 | 1,00 | 108,00 |
| 4 | 22,96 | 25,12 | 170,00 | 1,00 | 169,00 |
| 5 | 23,13 | 23,50 | 111,00 | 1,00 | 110,00 |
| 6 | 24,58 | 25,63 | 137,00 | 0,00 | 137,00 |
| 7 | 25,31 | 25,32 | 123,00 | 0,00 | 123,00 |
| 8 | 23,54 | 25,64 | 123,00 | 0,00 | 123,00 |
| 9 | 30,61 | 34,26 | 156,00 | 1,00 | 155,00 |
| **Total** | **22,00** | **23,93** | **170,00** | **0,00** | **170,00** |

**Table 3.22. Breadth of experience in the same industry**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 12,34 | 13,42 | 77,00 | 0,00 | 77,00 |
| 1 | 14,18 | 14,46 | 77,00 | 0,00 | 77,00 |
| 2 | 14,94 | 13,88 | 77,00 | 0,00 | 77,00 |
| 3 | 15,72 | 14,26 | 77,00 | 2,00 | 75,00 |
| 4 | 17,10 | 16,34 | 92,00 | 2,00 | 90,00 |
| 5 | 17,11 | 15,81 | 77,00 | 1,00 | 76,00 |
| 6 | 18,39 | 21,12 | 127,00 | 0,00 | 127,00 |
| 7 | 17,90 | 20,71 | 127,00 | 0,00 | 127,00 |
| 8 | 15,81 | 18,03 | 96,00 | 0,00 | 96,00 |
| 9 | 15,74 | 17,52 | 74,00 | 1,00 | 73,00 |
| **Total** | **15,88** | **16,58** | **127,00** | **0,00** | **127,00** |

**Table 3.23. Breadth of experience in other industries**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 55,17 | 52,00 | 257,00 | 0,00 | 257,00 |
| 1 | 62,81 | 58,12 | 280,00 | 0,00 | 280,00 |
| 2 | 65,25 | 61,02 | 309,00 | 0,00 | 309,00 |
| 3 | 66,93 | 62,85 | 344,00 | 0,00 | 344,00 |
| 4 | 70,43 | 69,20 | 373,00 | 0,00 | 373,00 |
| 5 | 68,04 | 72,23 | 373,00 | 0,00 | 373,00 |
| 6 | 69,20 | 71,45 | 406,00 | 0,00 | 406,00 |
| 7 | 64,85 | 64,47 | 406,00 | 0,00 | 406,00 |
| 8 | 61,21 | 57,25 | 247,00 | 0,00 | 247,00 |
| 9 | 67,74 | 72,00 | 330,00 | 4,00 | 326,00 |
| **Total** | **65,18** | **64,14** | **406,00** | **0,00** | **406,00** |

**Table 3.24. Breadth of general experience**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 67,50 | 58,36 | 275,00 | 0,00 | 275,00 |
| 1 | 76,98 | 64,96 | 302,00 | 0,00 | 302,00 |
| 2 | 80,19 | 67,18 | 320,00 | 0,00 | 320,00 |
| 3 | 82,65 | 69,63 | 366,00 | 2,00 | 364,00 |
| 4 | 87,53 | 77,88 | 398,00 | 2,00 | 396,00 |
| 5 | 85,14 | 80,13 | 398,00 | 1,00 | 397,00 |
| 6 | 87,59 | 86,23 | 533,00 | 0,00 | 533,00 |
| 7 | 82,74 | 79,33 | 533,00 | 0,00 | 533,00 |
| 8 | 77,03 | 66,40 | 277,00 | 0,00 | 277,00 |
| 9 | 83,47 | 81,58 | 351,00 | 5,00 | 346,00 |
| **Total** | **81,06** | **73,27** | **533,00** | **0,00** | **533,00** |

#### 3.3.4.2.3 Entrepreneurial experience

We could hardly understand the concept of DMCs without considering entrepreneurship. As Teece (2012) emphasizes, entrepreneurial managers create markets and orchestrate resources. Thus, in an analysis of dynamic capabilities, Zahra, Sapienza, and Davidsson (2006) highlight the role of the entrepreneur in reconfiguring organizational resources and routines. By examining prior entrepreneurial experience, we focus on a type of experience that has been of considerable interest to scholars studying organizational emergence and new firm performance (Stuart and Abetti, 1990), in areas such as NVs' survival (Delmar and Shane, 2004), NVs' growth (Colombo and Grilli, 2005), NVs' survival and sales (Delmar and Shane, 2006), strategic decision speed (Forbes, 2005), and the number of opportunities identified (Gruber, MacMillan, and Thompson, 2012).

We consider the following entrepreneurial variables: the number of founders that belong to a TMT, the years of entrepreneurial experience of the TMT members (a maximum of six years for each company) and the number of companies founded by the TMT.

**Table 3.25. Founders in the TMT**

| Period | Size of TMT | Mean of founders | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 1 | 1,0 | 6 | 0 | 6 |
| 1 | 3 | 1 | 1,0 | 6 | 0 | 6 |
| 2 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 3 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 4 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 5 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 6 | 3 | 1 | 0,8 | 4 | 0 | 4 |
| 7 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 8 | 3 | 1 | 0,9 | 4 | 0 | 4 |
| 9 | 3 | 1 | 0,8 | 3 | 0 | 3 |
| **Total** | **3** | **1** | **0,9** | **6** | **0** | **6** |

**Table 3.26. Entrepreneurial experience**

| Period | Mean experience | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 2,7 | 3,6 | 18,0 | 0,0 | 18,0 |
| 1 | 2,9 | 3,3 | 18,0 | 0,0 | 18,0 |
| 2 | 2,9 | 3,3 | 18,0 | 0,0 | 18,0 |
| 3 | 2,8 | 3,2 | 18,0 | 0,0 | 18,0 |
| 4 | 2,9 | 3,3 | 18,0 | 0,0 | 18,0 |
| 5 | 2,8 | 3,3 | 18,0 | 0,0 | 18,0 |
| 6 | 3,1 | 3,5 | 18,0 | 0,0 | 18,0 |
| 7 | 3,0 | 3,7 | 18,0 | 0,0 | 18,0 |
| 8 | 2,9 | 3,7 | 18,0 | 0,0 | 18,0 |
| 9 | 3,1 | 3,9 | 18,0 | 0,0 | 18,0 |
| **Total** | **2,9** | **3,4** | **18,0** | **0,0** | 18,0 |

**Table 3.27. Number of companies founded**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,8 | 1,0 | 5,0 | 0,0 | 5,0 |
| 1 | 3 | 0,7 | 0,9 | 5,0 | 0,0 | 5,0 |
| 2 | 3 | 0,7 | 0,7 | 4,0 | 0,0 | 4,0 |
| 3 | 3 | 0,6 | 0,7 | 3,5 | 0,0 | 3,5 |
| 4 | 3 | 0,6 | 0,7 | 3,5 | 0,0 | 3,5 |
| 5 | 3 | 0,6 | 0,8 | 4,0 | 0,0 | 4,0 |
| 6 | 3 | 0,6 | 0,8 | 4,0 | 0,0 | 4,0 |
| 7 | 3 | 0,6 | 0,8 | 4,0 | 0,0 | 4,0 |
| 8 | 3 | 0,6 | 0,7 | 3,0 | 0,0 | 3,0 |
| 9 | 3 | 0,6 | 0,7 | 3,0 | 0,0 | 3,0 |
| **Total** | **3** | **0,6** | **0,8** | **5,0** | **0,0** | **5,0** |

### 3.3.4.2.4 International experience

International experience has also been studied as a part of managerial human capital. Some studies show how international managerial experience provides a positive context for the speed at which foreign sales are obtained (Reuber and Fischer, 1997), international diversification (Tihanyi, Ellstrand, Daily, and Dalton, 2000), global strategic posture (Carpenter and Fredrickson, 2001), and the building of international alliances (Lee and Park, 2008).

International experience implies a broad vision of business, and we consider international variables to be the mean of the countries where TMT members have worked and the different nationalities in the team.

**Table 3.28. Number of countries**

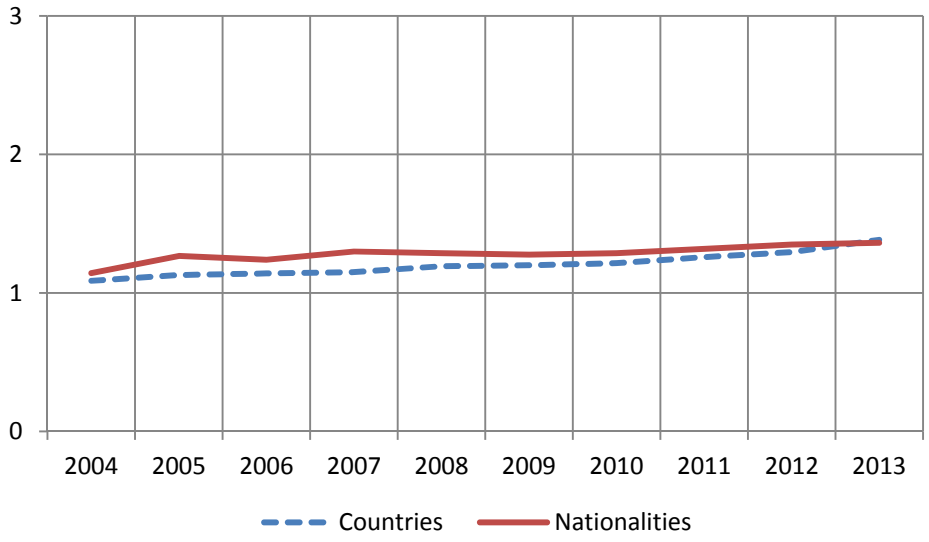
| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 1,2 | 0,3 | 2,5 | 1,0 | 1,5 |
| 1 | 3 | 1,2 | 0,3 | 2,7 | 1,0 | 1,7 |
| 2 | 3 | 1,2 | 0,3 | 2,5 | 1,0 | 1,5 |
| 3 | 3 | 1,2 | 0,4 | 3,0 | 1,0 | 2,0 |
| 4 | 3 | 1,2 | 0,4 | 3,3 | 1,0 | 2,3 |
| 5 | 3 | 1,2 | 0,4 | 3,7 | 1,0 | 2,7 |
| 6 | 3 | 1,3 | 0,5 | 3,7 | 1,0 | 2,7 |
| 7 | 3 | 1,3 | 0,5 | 4,0 | 1,0 | 3,0 |
| 8 | 3 | 1,3 | 0,5 | 4,0 | 1,0 | 3,0 |
| 9 | 3 | 1,4 | 0,6 | 3,0 | 1,0 | 2,0 |
| **Total** | **3** | **1,2** | **0,4** | **4,0** | **1,0** | **3,0** |

**Table 3.29. Number of nationalities**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 1,2 | 0,5 | 3 | 1 | 2 |
| 1 | 3 | 1,3 | 0,5 | 3 | 1 | 2 |
| 2 | 3 | 1,3 | 0,5 | 3 | 1 | 2 |
| 3 | 3 | 1,3 | 0,6 | 3 | 1 | 2 |
| 4 | 3 | 1,3 | 0,6 | 3 | 1 | 2 |
| 5 | 3 | 1,3 | 0,6 | 4 | 1 | 3 |
| 6 | 3 | 1,3 | 0,6 | 5 | 1 | 4 |
| 7 | 3 | 1,3 | 0,6 | 4 | 1 | 3 |
| 8 | 3 | 1,4 | 0,7 | 4 | 1 | 3 |
| 9 | 3 | 1,4 | 0,7 | 3 | 1 | 2 |
| **Total** | **3** | **1,3** | **0,6** | **5** | **1** | **4** |

Figure 3.11. shows us a slight upward trend in the international attributes of TMTs. This may in part be due to the begining of the crisis period in 2008, when companies needed teams with greater international experience in order to be able to expand into foreign markets.

**Figure 3.11. The international experience trend**




### 3.3.4.2.5 Heterogeneity

The managerial human capital framework provides a means to assess heterogeneity in managerial skills. Managers may differ both in the mix of their skills and in their level of ability in each type of skill (Adner and Helfat, 2003). In this context, it is important to distinguish between acquisition and breadth of knowledge and experience. Past experiences provide access to a diversity or breadth of knowledge, and the skills acquired may then drive the development of the specific types of managerial human capital that underlie dynamic managerial capabilities (Kor and Mesko, 2013; Martin, 2011).

Depending on the context, diversity may facilitate positive outcomes for the firm, or it may limit or balance them. The investigation of contextual factors may help

us to understand the link between team diversity and performance (Johnson, Schnatterly, and Hill, 2013).

For instance, in dynamic industry environments, heterogeneous TMTs (with heterogeneity in prior experience in terms of functional background, educational level, educational specialization and managerial skill) achieve more effective firm performance when led by a directive leader, whereas homogenous TMTs do best when led by an empowering leader (Hmieleski and Ensley, 2007). In contrast, within stable industry environments, heterogeneous TMTs achieve more effective firm performance when led by an empowering leader, whereas homogenous TMTs perform best when led by a directive leader.

Gruber, MacMillan, and Thompson (2012) found a positive relationship between the heterogeneity of the educational level of a TMT and the number of opportunities identified. Other authors have found relationships between the number of opportunities identified and heterogeneity. For instance, Kor (2003) and Hambrick (1996) found that heterogeneity of firm tenure in a TMT may influence its approach to identifying and seizing new growth opportunities.

Similarly, the educational diversity of TMTs is positively related to the satisfaction of team members, but not to the viability of teams as perceived by their members (Foo, Sin, and Yiong, 2006). Similarly, Amason et al. (2006) found no direct relationship between the heterogeneity of TMTs' prior experience (in terms of level of education, specialization in education, and functional background) and firm performance.

Although gender diversity in management teams is limited, studies on team composition show that in recent years it has increased, particularly in small and mid-sized companies. Low levels of heterogeneity (i.e. all male directors) can significantly reduce social integration (Williams and O'Reilly, 1998) and can impact negatively on firm performance (Westphal and Bednar, 2005).

We examined four types of TMT heterogeneity: educational level heterogeneity, educational background heterogeneity, gender heterogeneity, and company tenure heterogeneity.

To measure the heterogeneity index we have used the Herfindal-Hirschman Index:

$$H = 1 - \sum p_i^2,$$

where $H$ is the heterogeneity measure and $p$ the percentage of TMT members in each of the $i$ categories, which are the following:

- Categories of educational level: 4 (1 = no higher/university studies; 2 = higher/university studies, such as bachelor's degree; 3 = master's degree or similar; 4 = PhD).
- Categories of educational background (Hambrick, Cho, and Chen, 1996): 8 (1 = engineering, 2 = science, 3 = business administration, 4 = economics, 5 = liberal arts, 6 = law, 7 = accounting and finance, 8 = other).
- Categories of functional background (Hambrick, Cho, and Chen, 1996): 16 (1 = CEO (chief executive officer), 2 = COO (chief operations officer), 3 = finance/treasurer, 4 = planning, 5 = personnel, 6 = public affairs, 7 = general counsel/secretary, 8 = operations/field service, 9 = marketing/sales/customer service, 10 = information system, 11 = international, 12 = maintenance/field service, 13 = general management, 14 = other corporate staff, 15 = accounting/controller, 16 = other).
- Categories of functional background (Westphal and Bednar, 2005): 3 (1 = throughput functions (engineering, operations, or research and development), 2 = output functions (marketing or sales), 3 = peripheral functions (finance and law)).
- Categories of gender: 2 (1 = male, 2 = female).

The heterogeneity of firm tenure in TMTs is measured as the standard deviation of firm tenure divided by the average level of firm tenure in the team (Finkelstein and Hambrick, 1996; Kor, 2003).

#### 3.3.4.2.5.1 Knowledge level heterogeneity

**Table 3.30. Knowledge level heterogeneity**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 1 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 2 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 3 | 3 | 0,4 | 0,2 | 0,9 | 0,0 | 0,4 |
| 4 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 5 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 6 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 7 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,4 |
| 8 | 3 | 0,4 | 0,3 | 1,0 | 0,0 | 0,4 |
| 9 | 3 | 0,3 | 0,2 | 0,8 | 0,0 | 0,3 |
| **Total** | **3** | **0,4** | **0,3** | **1,0** | **0,0** | **0,4** |

#### 3.3.4.2.5.2 Knowledge background heterogeneity

**Table 3.31. Knowledge background heterogeneity**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,4 | 0,3 | 0,9 | 0,0 | 0,9 |
| 1 | 3 | 0,5 | 0,3 | 0,9 | 0,0 | 0,9 |
| 2 | 3 | 0,5 | 0,2 | 0,9 | 0,0 | 0,9 |
| 3 | 3 | 0,5 | 0,2 | 0,9 | 0,0 | 0,9 |
| 4 | 3 | 0,5 | 0,3 | 0,9 | 0,0 | 0,9 |
| 5 | 3 | 0,5 | 0,3 | 0,9 | 0,0 | 0,9 |
| 6 | 3 | 0,5 | 0,3 | 0,9 | 0,0 | 0,9 |
| 7 | 3 | 0,5 | 0,3 | 0,9 | 0,0 | 0,9 |
| 8 | 3 | 0,5 | 0,3 | 1,0 | 0,0 | 1,0 |
| 9 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| **Total** | **3** | **0,5** | **0,3** | **1,0** | **0,0** | **1,0** |

### 3.3.4.2.5.3 Functional background heterogeneity (Hambrick, Cho, and Chen, 1996; Westphal and Bednar, 2005)

**Table 3.32. Functional background heterogeneity (Hambrick, Cho, and Chen, 1996)**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,4 | 0,3 | 0,8 | 0,0 | 0,8 |
| 1 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 2 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 3 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 4 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 5 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 6 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 7 | 3 | 0,5 | 0,2 | 0,8 | 0,0 | 0,8 |
| 8 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 9 | 3 | 0,4 | 0,2 | 0,7 | 0,0 | 0,7 |
| **Total** | **3** | **0,5** | **0,2** | **0,8** | **0,0** | **0,8** |

**Table 3.33. Functional background heterogeneity (Westphal and Bednar, 2005)**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,3 | 0,2 | 0,8 | 0,0 | 0,8 |
| 1 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 2 | 3 | 0,4 | 0,2 | 0,7 | 0,0 | 0,7 |
| 3 | 3 | 0,4 | 0,2 | 0,7 | 0,0 | 0,7 |
| 4 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 5 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 6 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 7 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 8 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| 9 | 3 | 0,4 | 0,2 | 0,8 | 0,0 | 0,8 |
| **Total** | **3** | 0,3 | 0,2 | 0,8 | 0,0 | 0,8 |

#### 3.3.4.2.5.4 Gender heterogeneity

**Table 3.34. Gender heterogeneity**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,0 | 0,1 | 0,6 | 0,0 | 0,6 |
| 1 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 2 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 3 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 4 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 5 | 3 | 0,1 | 0,1 | 0,6 | 0,0 | 0,6 |
| 6 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 7 | 3 | 0,1 | 0,2 | 0,6 | 0,0 | 0,6 |
| 8 | 3 | 0,1 | 0,1 | 0,5 | 0,0 | 0,5 |
| 9 | 3 | 0,0 | 0,1 | 0,5 | 0,0 | 0,5 |
| **Total** | **3** | **0,1** | **0,2** | **0,6** | **0,0** | **0,6** |

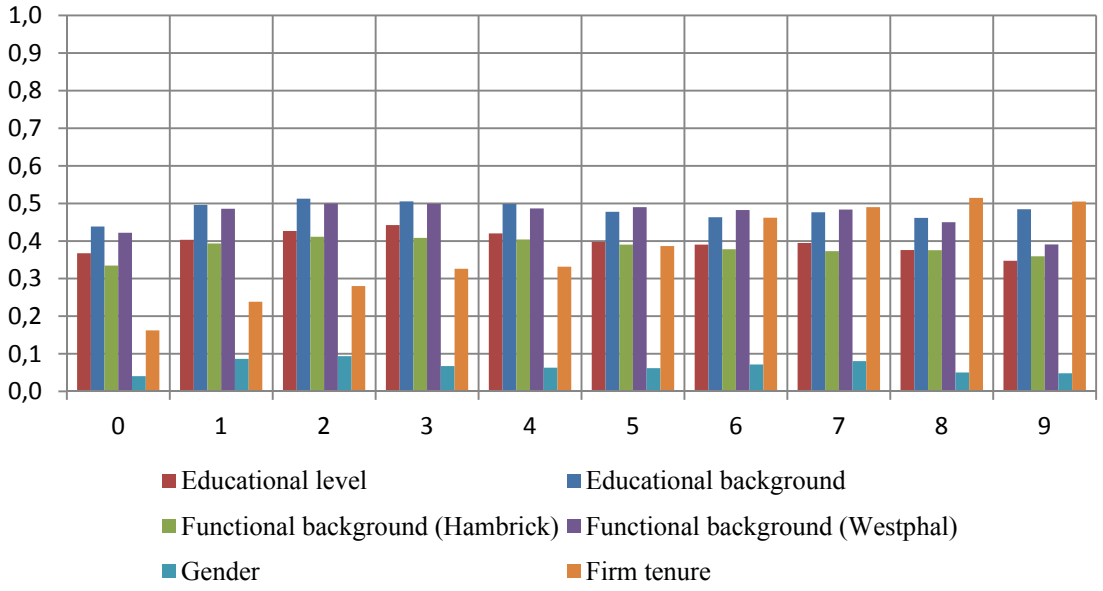
#### 3.3.4.2.5.5 Firm tenure heterogeneity

**Table 3.35. Firm tenure heterogeneity**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,2 | 0,3 | 1,2 | 0,0 | 1,2 |
| 1 | 3 | 0,2 | 0,3 | 1,0 | 0,0 | 1,0 |
| 2 | 3 | 0,3 | 0,3 | 1,6 | 0,0 | 1,6 |
| 3 | 3 | 0,3 | 0,3 | 1,5 | 0,0 | 1,5 |
| 4 | 3 | 0,3 | 0,3 | 1,2 | 0,0 | 1,2 |
| 5 | 3 | 0,4 | 0,3 | 1,2 | 0,0 | 1,2 |
| 6 | 3 | 0,5 | 0,4 | 1,3 | 0,0 | 1,3 |
| 7 | 3 | 0,5 | 0,3 | 1,3 | 0,0 | 1,3 |
| 8 | 3 | 0,5 | 0,4 | 1,5 | 0,0 | 1,5 |
| 9 | 3 | 0,5 | 0,4 | 1,3 | 0,0 | 1,3 |
| **Total** | **3** | **0,4** | **0,3** | **1,6** | **0,0** | **1,6** |

In general, we can see (Figure 3.12.) average levels of heterogeneity in the teams, although with regard to gender all the homogenous teams are mostly made up of males.

**Figure 3.12. Level of heterogeneity in TMTs**




### 3.3.4.3 Managerial social capital variables

Managerial social capital involves managers' abilities to access resources through relationships and connections (Adler and Kwon, 2002). There are two main types of social capital: internal and external, and each one brings different strengths to the team (Tian, Haleblian, and Rajagopalan, 2011).

#### 3.3.4.3.1 Internal social capital

We define internal social capital in terms of the board's co-working experience. Consistent with previous research (Barkema and Shvyrkov, 2007; Tian, Haleblian, and Rajagopalan, 2011), a TMT's co-working experience is calculated as the overlap in executive directors' team tenures based on the following formula:

$$tenure\ overlap = \frac{1}{n}\sum \min(u_i; u_j),$$

where $u_i$ is the team tenure of the $i^{th}$ executive and n is the number of pairwise comparisons.

**Table 3.35. Internal social capital (tenure overlap)**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,4 | 0,3 | 1,0 | 0,0 | 1,0 |
| 1 | 3 | 1,0 | 0,5 | 2,0 | 0,0 | 2,0 |
| 2 | 3 | 1,6 | 0,8 | 3,0 | 0,0 | 3,0 |
| 3 | 3 | 2,1 | 1,1 | 4,0 | 0,0 | 4,0 |
| 4 | 3 | 2,6 | 1,4 | 5,0 | 0,0 | 5,0 |
| 5 | 3 | 2,8 | 1,8 | 6,0 | 0,0 | 6,0 |
| 6 | 3 | 3,0 | 2,1 | 7,0 | 0,0 | 7,0 |
| 7 | 3 | 3,3 | 2,5 | 8,0 | 0,0 | 8,0 |
| 8 | 3 | 3,4 | 2,9 | 9,0 | 0,0 | 9,0 |
| 9 | 3 | 3,4 | 3,0 | 9,5 | 0,0 | 9,5 |
| **Total** | **3** | **2,2** | **1,9** | **9,5** | **0,0** | **9,5** |

#### 3.3.4.3.2 External social capital

External social capital leads to access to external resources. Frequently, external ties have been operationalized in the form of directorships of other companies (interlocks) by strategy researchers analyzing the social capital of managers. We measure external social capital through the interlocks (directorships) that executives hold in other companies. We distinguish between the interlocks being held in the same or different sectors by the use of NACE codes.

**Table 3.36. External social capital (interlocks in the same sector)**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,8 | 2,1 | 12,0 | 0,0 | 12 |
| 1 | 3 | 1,0 | 2,5 | 16,0 | 0,0 | 16 |
| 2 | 3 | 1,2 | 2,6 | 15,0 | 0,0 | 15 |
| 3 | 3 | 1,5 | 3,2 | 21,0 | 0,0 | 21 |
| 4 | 3 | 1,6 | 3,7 | 30,0 | 0,0 | 30 |
| 5 | 3 | 1,5 | 3,6 | 30,0 | 0,0 | 30 |
| 6 | 3 | 1,6 | 4,2 | 34,0 | 0,0 | 34 |
| 7 | 3 | 1,7 | 5,5 | 50,0 | 0,0 | 50 |
| 8 | 3 | 1,2 | 2,7 | 12,0 | 0,0 | 12 |
| 9 | 3 | 1,3 | 3,1 | 13,0 | 0,0 | 13 |
| **Total** | **3** | **1,4** | **3,5** | **50,0** | **0,0** | **50** |

**Table 3.37. External social capital (interlocks in different sectors)**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 6 | 9 | 70 | 0 | 70 |
| 1 | 3 | 9 | 12 | 77 | 0 | 77 |
| 2 | 3 | 8 | 10 | 54 | 0 | 54 |
| 3 | 3 | 8 | 10 | 56 | 0 | 56 |
| 4 | 3 | 9 | 11 | 65 | 0 | 65 |
| 5 | 3 | 8 | 13 | 91 | 0 | 91 |
| 6 | 3 | 8 | 10 | 50 | 0 | 50 |
| 7 | 3 | 9 | 18 | 171 | 0 | 171 |
| 8 | 3 | 7 | 7 | 29 | 0 | 29 |
| 9 | 3 | 7 | 8 | 38 | 0 | 38 |
| **Total** | **3** | **8** | **12** | **171** | **0** | **171** |

### 3.3.4.4 Managerial cognition variables

A shared prior experience in a TMT, that is to say an overlap in human capital and social capital, is quite common. It can enable TMTs to make quick and unified strategic decisions (Kor and Misangyi, 2008). The prior shared experience and background characteristic of managers have served as an observable proxy for unobservable cognitive mental models (Townsend and Busenitz, 2014). We take into account the 10 years previous to the registration of the company and check the shared experience of TMT members.

Following the work of Zheng (2012), the number of years of prior shared experience of co-working has been calculated by pair comparison using the sum of the minimums ($u_{itk}$,$u_{jtk}$):

$$pre-tenure\ overlap = \frac{1}{n_{it}\ \frac{n_{it}-1}{2}} \sum \min(u_{itk}; u_{jtk}),$$

where $n_{it}$ is the size of the TMT (company = *i*; period = *t*), $u_{itk}$ is the tenure of the executive *i* in the *t* period and *k* firm, and $u_{jtk}$ is the tenure of the executive *j* in the same period (*t*) and in the same company (*k*). We also consider the number of companies where executives have worked together and the number of previous links among the team. We introduce the concept of pre-tenure overlap, calculated through the same formula that is used for the tenure overlap but refereed to the period of ten years before

the company was founded. We make use of these variables as a proxy of managerial cognition.

We introduce the previous shared experience of the team as a proxy of managerial cognition. In this context, we consider the years of co-working from 1994 to the year just before the company was registered, the number of companies where TMT members have worked together previously, the pre-tenure overlap (which is worked out in the same way as the tenure overlap but considering the previous instead of the current tenure), and the previous links among the team.

#### 3.3.4.4.1 Prior shared experience

**Table 3.38. Years of prior shared experience**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 1,6 | 2,9 | 16,6 | 0,0 | 16,6 |
| 1 | 3 | 1,7 | 3,1 | 16,7 | 0,0 | 16,7 |
| 2 | 3 | 1,5 | 2,9 | 16,7 | 0,0 | 16,7 |
| 3 | 3 | 1,3 | 2,7 | 16,7 | 0,0 | 16,7 |
| 4 | 3 | 1,2 | 2,7 | 16,7 | 0,0 | 16,7 |
| 5 | 3 | 1,1 | 2,3 | 12,0 | 0,0 | 12,0 |
| 6 | 3 | 1,0 | 2,5 | 15,8 | 0,0 | 15,8 |
| 7 | 3 | 0,9 | 2,6 | 15,8 | 0,0 | 15,8 |
| 8 | 3 | 0,6 | 1,9 | 12,7 | 0,0 | 12,7 |
| 9 | 3 | 0,3 | 1,3 | 8,1 | 0,0 | 8,1 |
| **Total** | **3** | **1,2** | **2,7** | **16,7** | **0,0** | **16,7** |

#### 3.3.4.4.2 Previous co-working companies

**Table 3.39. Number of companies where TMTs have previously worked together**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 2 | 4 | 28 | 0 | 28 |
| 1 | 3 | 2 | 5 | 28 | 0 | 28 |
| 2 | 3 | 2 | 5 | 28 | 0 | 28 |
| 3 | 3 | 2 | 5 | 28 | 0 | 28 |
| 4 | 3 | 2 | 5 | 28 | 0 | 28 |
| 5 | 3 | 2 | 5 | 28 | 0 | 28 |
| 6 | 3 | 2 | 5 | 27 | 0 | 27 |
| 7 | 3 | 1 | 4 | 26 | 0 | 26 |
| 8 | 3 | 1 | 3 | 25 | 0 | 25 |
| 9 | 3 | 1 | 2 | 7 | 0 | 7 |
| **Total** | **3** | **2** | **5** | **28** | **0** | **28** |

#### 3.3.4.4.3 Pre-tenure overlap

**Table 3.40. Pre-tenure overlap**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 1,9 | 3,7 | 17,1 | 0,0 | 17,1 |
| 1 | 3 | 2,0 | 6,6 | 65,6 | 0,0 | 65,6 |
| 2 | 3 | 2,4 | 8,3 | 65,6 | 0,0 | 65,6 |
| 3 | 3 | 2,2 | 8,2 | 65,6 | 0,0 | 65,6 |
| 4 | 3 | 1,8 | 6,7 | 65,6 | 0,0 | 65,6 |
| 5 | 3 | 1,7 | 6,8 | 65,6 | 0,0 | 65,6 |
| 6 | 3 | 1,8 | 6,9 | 65,6 | 0,0 | 65,6 |
| 7 | 3 | 1,9 | 7,7 | 65,6 | 0,0 | 65,6 |
| 8 | 3 | 0,7 | 2,4 | 12,4 | 0,0 | 12,4 |
| 9 | 3 | 0,3 | 1,5 | 9,5 | 0,0 | 9,5 |
| **Total** | **3** | **1,8** | **6,7** | **65,6** | **0,0** | **65,6** |

#### 3.3.4.4.4 Previous links

**Table 3.41. Previous links**

| Period | Size of TMT | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|---|
| 0 | 3 | 0,9 | 2,0 | 15,0 | 0,0 | 15,0 |
| 1 | 3 | 0,9 | 1,9 | 15,0 | 0,0 | 15,0 |
| 2 | 3 | 0,7 | 1,4 | 8,0 | 0,0 | 8,0 |
| 3 | 3 | 0,6 | 1,2 | 8,0 | 0,0 | 8,0 |
| 4 | 3 | 0,6 | 1,2 | 8,0 | 0,0 | 8,0 |
| 5 | 3 | 0,6 | 1,2 | 8,0 | 0,0 | 8,0 |
| 6 | 3 | 0,5 | 1,3 | 8,0 | 0,0 | 8,0 |
| 7 | 3 | 0,4 | 0,9 | 6,0 | 0,0 | 6,0 |
| 8 | 3 | 0,3 | 0,9 | 6,0 | 0,0 | 6,0 |
| 9 | 3 | 0,3 | 0,7 | 3,0 | 0,0 | 3,0 |
| **Total** | **3** | **0,6** | **1,4** | **15,0** | **0,0** | **15,0** |

### 3.3.5 Performance variables

In order to measure the performance of the firms we have gathered financial variables from several sources, such as Amadeus, Morningstar, Annual Report and AIM (London Stock Exchange).

The seminal paper about dynamic managerial capabilities by Adner and Helfat (2003) used annual return on assets (ROA) as a dependent variable. Other empirical studies use as dependent variables top management change (Boeker and Wiltbank, 2005), rate of entrepreneurial growth (Kor, 2003), early-stage capital raised (Townsend and Busenitz, 2014), and market-based measurement of economic performance such as as Tobin's *q* (Sirmon and Hitt, 2009), among others.

We use performance variables like return on assets (ROA), return on equity (ROE), return on capital employed (ROCE), price of shares, and total assets.

#### 3.3.5.1 Return on assets (ROA)

Return on assets (ROA) is a profitability ratio that reflects how profitable a company is relative to its total assets. ROA gives an idea as to how efficient a TMT is at using its assets to generate earnings. ROA has been calculated by dividing a company's annual earnings by its total assets x 100. ROA is displayed as a percentage.

$$\boldsymbol{ROA = \frac{Profit\ before\ tax}{Total\ assets} x\ 100}$$

**Table 3.42. ROA**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | -9,84 | 29,78 | 73,02 | -88,85 | 161,87 |
| 1 | -14,50 | 27,51 | 44,82 | -85,92 | 130,74 |
| 2 | -13,06 | 27,05 | 33,91 | -96,53 | 130,44 |
| 3 | -13,63 | 26,58 | 27,41 | -98,16 | 125,57 |
| 4 | -13,82 | 24,86 | 22,98 | -84,71 | 107,69 |
| 5 | -12,88 | 24,92 | 23,04 | -97,96 | 121,00 |
| 6 | -11,96 | 25,71 | 32,56 | -87,93 | 120,49 |
| 7 | -13,70 | 27,02 | 29,40 | -91,48 | 120,88 |
| 8 | -19,56 | 29,80 | 26,35 | -94,91 | 121,26 |
| 9 | -14,86 | 27,09 | 21,59 | -81,02 | 102,61 |
| **Total** | **-13,51** | **26,88** | **73,02** | **-98,16** | **171,18** |

### 3.3.5.2 Return on equity (ROE)

Return on equity (ROE) is a profitability measurement that reveals how much profit a company generates with the money shareholders have invested. ROE has been calculated by dividing a company's net income by shareholders' equity x 100. ROE is expressed as a percentage and calculated as:

$$\boldsymbol{ROE = \frac{Net\ incomes}{Shareholder's\ equity} x\ 100}$$

**Table 3.43. ROE**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | -15,95 | 72,53 | 251,78 | -357,79 | 609,57 |
| 1 | -40,58 | 108,95 | 127,08 | -621,59 | 748,67 |
| 2 | -34,88 | 98,48 | 88,03 | -674,39 | 762,42 |
| 3 | -32,20 | 94,42 | 139,77 | -711,31 | 851,08 |
| 4 | -31,68 | 78,76 | 88,57 | -575,61 | 664,18 |
| 5 | -21,38 | 55,34 | 129,24 | -349,62 | 478,86 |
| 6 | -22,90 | 61,79 | 108,50 | -348,43 | 456,93 |
| 7 | -27,04 | 71,10 | 98,79 | -414,04 | 512,83 |
| 8 | -48,85 | 100,61 | 91,49 | -522,99 | 614,48 |
| 9 | -45,63 | 89,41 | 85,65 | -416,32 | 501,97 |
| **Total** | **-31,21** | **85,42** | **251,78** | **-711,31** | **963,09** |

### 3.3.5.3 Return on capital employed (ROCE)

Return on capital employed (ROCE) is a long-term profitability ratio. It measures the efficiency with which a company's capital is employed by comparing net operating profit to capital employed. ROCE is a more useful ratio than ROE for evaluating the longevity of a company because it shows how effectively assets are performing while taking long-term financing into consideration.

$$ROCE = \frac{Net\ operating\ profit}{Employed\ capital}$$

**Table 3.44. ROCE**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | -21,64 | 68,27 | 138,34 | -353,92 | 492,26 |
| 1 | -31,78 | 80,99 | 100,67 | -369,18 | 469,85 |
| 2 | -42,39 | 129,32 | 75,21 | -868,86 | 944,07 |
| 3 | -35,36 | 127,14 | 141,42 | -864,86 | 1.006,28 |
| 4 | -39,34 | 120,08 | 90,35 | -786,33 | 876,68 |
| 5 | -17,64 | 61,00 | 129,95 | -348,68 | 478,63 |
| 6 | -20,51 | 84,13 | 107,70 | -590,83 | 698,53 |
| 7 | -20,88 | 79,72 | 98,99 | -414,47 | 513,46 |
| 8 | -24,11 | 65,49 | 92,08 | -343,28 | 435,36 |
| 9 | -11,27 | 45,05 | 85,93 | -112,89 | 198,82 |
| **Total** | **-28,54** | **97,22** | **141,42** | **-868,86** | **1.010,28** |

### 3.3.5.4 Share prices

We use the annual share price as a performance variable. Because our sample is composed of firms which entered AIM in their two first years of life, we have placed importance on how share prices indicate a TMT's efficiency in terms of generating business expectations.

**Table 3.45. Share prices**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 1,48 | 1,16 | 5,68 | 0,037 | 5,64 |
| 1 | 129,84 | 1.213,56 | 11.705,79 | 0,023 | 11.705,77 |
| 2 | 81,97 | 836,44 | 8.893,58 | 0,020 | 8.893,56 |
| 3 | 21,22 | 204,97 | 2.292,33 | 0,010 | 2.292,32 |
| 4 | 8,84 | 79,39 | 855,78 | 0,004 | 855,78 |
| 5 | 1,26 | 3,83 | 38,60 | 0,001 | 38,60 |
| 6 | 1,03 | 2,74 | 25,51 | 0,005 | 25,50 |
| 7 | 0,85 | 1,72 | 11,74 | 0,002 | 11,74 |
| 8 | 0,55 | 0,74 | 3,68 | 0,001 | 3,68 |
| 9 | 0,87 | 1,39 | 5,58 | 0,001 | 5,58 |
| **Total** | **27,77** | **493,58** | **11.705,79** | **0,001** | **11.705,79** |

### 3.3.5.5 Total assets

Total assets refer to the total amount of assets owned by a person or entity. In the accounting industry, assets are defined as anything that a business owns, has value, and can be converted into cash. In other terms, assets are items of economic value, which may be expended over time to yield a benefit for the owner.

**Table 3.46. Total assets**

| Period | Mean | SD | Max | Min | Range |
|---|---|---|---|---|---|
| 0 | 50,49 | 110,36 | 716,00 | 1,04 | 714,96 |
| 1 | 67,58 | 151,82 | 811,00 | 1,09 | 809,91 |
| 2 | 45,49 | 77,12 | 593,00 | 1,00 | 592,00 |
| 3 | 67,17 | 139,89 | 897,00 | 1,06 | 895,94 |
| 4 | 64,35 | 119,61 | 841,00 | 1,11 | 839,89 |
| 5 | 74,21 | 127,54 | 640,00 | 1,20 | 638,80 |
| 6 | 98,97 | 181,47 | 934,00 | 1,01 | 932,99 |
| 7 | 83,64 | 148,27 | 813,00 | 1,08 | 811,92 |
| 8 | 80,37 | 161,51 | 951,00 | 1,36 | 949,64 |
| 9 | 101,56 | 186,94 | 776,00 | 1,19 | 774,82 |
| **Total** | **71,61** | **141,10** | **951,00** | **1,00** | **950,00** |

# CHAPTER 4: Methodology

## 4.1 Introduction

One of the main goals of this thesis is to offer a measurement of DMCs. As Adner and Helfat (2003) identified, the three core underpinnings of DMCs provide the capacity to direct strategic change: managerial human capital (Becker, 1964; Becker, 1993), managerial social capital (Burt, 1992; Burt, 1997), and managerial cognition (Huff, 1990; Adler and Kwon, 2002).

In Chapter 2, we discuss how these DMC attributes have been measured in the case of new ventures. For instance, managerial human capital has mainly been measured through education and experience. In the case of education, both level (e.g. Van de Ven, Andrew H, Hudson, and Schroeder, 1984; Cooper, Woo, and Dunkelberg, 1989; Cooper, Gimeno-Gascón, and Woo, 1997; Haber and Reichel, 2007) and diversity (e.g. Haber and Reichel, 2007; Nielsen, 2015) have been used as tools to measure the founder's or the founding team's knowledge. With regard to professional experience, we can distinguish between specific experience in the same industry or firm (Colombo and Grilli, 2005; Li and Zhang, 2007), management experience (Bates, 1990; Kor and Mahoney, 2005), and entrepreneurial experience (Stuart and Abetti, 1990; Delmar and Shane, 2006; Nielsen, 2015). Different conclusions have been reached, but we can nevertheless affirm that in general, a higher level of knowledge and experience implies a higher level of performance in the context of NVs.

In the case of managerial social capital, initial network relationships clearly have a strong impact on NVs' performance by facilitating entry into new markets (Prashantham and Dhanaraj, 2010). In addition, the relationship between founders' ties and internationalization is stronger for NVs (Prashantham, Dhanaraj, and Kumar, 2015). Furthermore, teams with stronger social capital are capable of attracting more financial resources for the company. However, we miss measurements such as tenure overlap (internal social capital) and interlocks (external social capital), which involve managers' abilities to access resources through both internal and external relationships and connection.

Finally, managerial cognition involves schemas and mental models that include a system of theories and propositions (Huff, 1990) that managers use to see their way through a bewildering flow of information and make decisions (Walsh, 1995). Despite being a difficult variable to measure, previous researchers have used the demographic diversity of TMTs as a proxy for cognitive diversity (Finkelstein, Hambrick, and

Cannella, 2009), letters to shareholders from companies' annual reports to estimate mental models of TMT (Nadkarni and Narayanan, 2007), and prior shared experience as a proxy for the shared mental model and cohesion of the team (Zheng, 2012).

Nevertheless, only the work of Townsend and Busenitz (2014) has used the underpinnings advanced by Adner and Helfat (2003) for managerial human capital, social capital and cognition as a proxy for DMCs in NVs. Based on their measurement of DMCs, they identified two kinds of teams: strong and weak. Their results suggest that early-stage investors favour investing in firms with strong teams. However, less is known about the development of DMCs in NVs. We propose through this thesis a longitudinal study of DMCs in NVs.

We measure the DMCs of 126 service NVs during their first 10 years of activity. We gather variables from secondary sources such as annual reports, the Amadeus database and LexisNexis. In this chapter we explain how we built a measurement of DMCs through factor analysis, and its validation and reliability assessment.

## 4.2 Sources and variables

In order to get longitudinal data from the TMTs' companies, we downloaded annual reports from AIM and the websites of the firms from the date of registration to 2013. The first step was to identify executive members in the Board section. As general rule, we consider TMTs to be executive members who are included in the annual report's Board section.

Once the person has been identified, we look him/her up on the Amadeus company record and get the UCI (Unique Contact Identifier). When we have all the TMTs' UCIs, we introduce them into Amadeus and upload the professional background of the team.

For instance, Table 4.1. shows us the board composition of company nº 26, In-Deed Online, whose current name is Learning Technologies Group PLC, with ISIN number GB00B4T7HX10, and which was registration in 2010 and entered AIM in 2011.

In 2010, the year of registration, the board of the company was made up of four members, two non-executives and two executives. Our interest is focused on the

executive members. They are Peter Gordon, as CEO and Managing Director from 2007 to 2013, and Craig Smiley, as Operations Director from 2010 to 2011. We can see how in 2013 the board suffered a radical turnover (Table 4.1.). Three members of the original team resigned and three new ones were appointed, including the CEO and the Chairman.

The following variables have been extracted from Amadeus: Last name; UCI (Unique Contact Identifier); Full name; Gender; Date of birth; Age; Age bracket; Country of nationality; Biography; College; Degree code; Major discipline; Graduation date; Current position held in any company; Previous position held in any company; Previous position held in any inactive company; Number of current positions (all types); Number of previous positions (all types); Number of current positions on boards & committees; Number of previous positions on boards & committees; Number of current management positions; Number of previous management positions; Number of current contact & staff positions; Number of previous contact & staff positions; Number of current shareholder positions; Number of previous shareholder positions; Number of current advisor positions; Number of previous advisor positions; Company name; BvD ID number; Company country; Original job title; Type of position; Body or department; Standardized position; Current or previous position; Appointment date; Resignation date; Also a shareholder; Information Provider(s); Information source(s); Work country; NACE code.

Other sources have been used in order to complete missing data, such as LexisNexis and professional social networks like LinkedIn, Zoominfo and Bloomerg.

**Table 4.1. Board composition of company nº 26, In-Deed Online**

| N | ID NUMBER | Name | Year of birth | Education | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|
| 1 | P005303051 | **Harry Hill** | 04/04/1948 | Chartered surveyor | CHAIRMAN (AP 03/03/2010) | CHAIRMAN | CHAIRMAN | NON-EXECUTIVE DIRECTOR |
| 2 | P046896950 | **Peter Gordon** | 27/02/1963 | MBA (London Business School) | CEO & MANAGING DIRECTOR (AP 07/07/2010) | CEO & MANAGING DIRECTOR | CEO & MANAGING DIRECTOR | CEO & MANAGING DIRECTOR (RES 08/11/2013) |
| 3 | P045098427 | **Philip Williamson** | 11/12/1947 | Honorary Doctorate, University of Bath. Bachelor of Arts Hons, Economics, University of Newcastle | | NON-EXECUTIVE (AP 26/05/2011) | NON-EXECUTIVE | NON-EXECUTIVE (RES 08/11/2013) |
| 4 | P020882482 | **Boris Zhilin** | 03/05/1972 | B.S. in Finance, Economics, and Managerial Statistics, Syracuse University's School of Management | NON-EXECUTIVE (AP 03/08/2010) | NON-EXECUTIVE | NON-EXECUTIVE | NON-EXECUTIVE (RES 08/11/2013) |
| 5 | P004199757 | **Craig Smiley** | 03/12/1971 | Mechanical Engineering, Auckland University of Technology | OPERATIONS DIRECTOR (AP 30/09/2010) | OPERATIONS DIRECTOR (RES 26/05/2011) | | |
| 6 | P162737091 | **Andrew Brode** | 01/01/1940 | Chartered accountant | | | | NON- EXECUTIVE CHAIRMAN (AP 08/11/2013) |
| 7 | P046960496 | **Peter Mountford** | 29/08/1957 | Chartered accountant with an MBA from Warwick University | | | | EXECUTIVE DEPUTY CHAIRMAN (AP 08/11/2013) |
| 8 | P045582043 | **Jonathan Satchell** | 28/10/1966 | Grammar School (Lawrence Sheriff) | | | | CEO (AP 08/11/2013) |

Note: AP (appointment), RES (resigned).

## 4.3 Validation and reliability assessment

### 4.3.1 Content validity

Content validity consists of uncovering the main aspects and frontiers of the construct in order to specify its conceptual domain (Hinkin, 1998), and ensuring that operational indicators properly reflect a particular theoretical domain (Kerlinger, 1986). Building on the comprehensive literature review in Chapter 2 of this thesis, we construct each underpinning according to prior research.

**Managerial human capital**

Becker (1964) conceptualized human capital as learned skills and knowledge that individuals develop through their prior experience, training, and education. Previous researchers (Gimeno, Folta, Cooper, and Woo, 1997), have operationalized general human capital as years of education, managerial experience and work experience, and specific (industry or firm) human capital as experience of expertise in specific functional areas of the same firm. In the case of NVs, the effect of the prior experience of TMT members is conceptualized as the educational level and the functional background of team members (Amason, Shrader, and Tompson, 2006), and industry specific management experience and firm tenure (Finkelstein and Hambrick, 1996; Kor, 2003).

Knowledge gained through entrepreneurial experience shapes the TMT's decisions and behaviours. Prior knowledge about markets and customer problems, and knowledge about how to serve markets will influence individuals' discovery of opportunities, thus influencing entrepreneurial behaviours (Shane, 2000). We consider that the entrepreneurial variables are the mean of years of entrepreneurial experience and the number of companies founded by the TMT.

International experience implies a broad vision of business. The accumulation of experience and valuable knowledge as firms internationalize their operations improves the odds of organizational survival and success in markets (Mudambi and Zahra, 2007). We consider that the international variables are the mean of countries where TMT members have worked and the number of nationalities in the team.

Specifically, we consider the following variables of a TMT to be managerial human capital:

**Knowledge:**

- Level of knowledge: where 1 = no higher/university studies; 2 = bachelor's degree or similar; 3 = master's degree or similar; 4 = PhD)
- % of members of the TMT with a master's degree or PhD studies
- % of members of the TMT with studies linked to their functional areas

**Professional experience: depth and breadth**

**Depth of experience**

- Depth of experience in the firm: number of years worked in the firm
- Depth of experience in the corporate group: number of years of worked in the corporate group
- Depth of experience in the industry: number of years worked in the industry (by NACE code)
- Depth of experience in other industries: number of years worked in other industries (by NACE code)
- Depth of general experience: total number of years worked

**Breadth of experience**

- Breadth of experience in the corporate group: number of companies belonging to the corporate group where TMT members have worked
- Breadth of experience in the industry: number of companies belonging to the same industry where TMT members have worked (by NACE code)
- Breadth of experience in other industries: number of companies belonging to different industries where TMT members have worked (by NACE code)
- Breadth of general experience: total number of companies where TMT members have worked

**Entrepreneurial experience**

- Number of companies founded by the TMT (mean)
- Number of founders in the TMT (mean)
- Number of years of experience of TMT members as founders (considering a peak of six years for each new company founded)

**International experience**

- Number of countries where TMT members have worked (mean)
- Number of nationalities of TMT members

**Heterogeneity**

We examined four types of TMT heterogeneity: educational level heterogeneity, educational background heterogeneity, gender heterogeneity and company tenure heterogeneity.

The Herfindal-Hirschman Index has been used for measuring the heterogeneity index:

$$H = 1 - \sum p_i^2 ,$$

where $H$ is the heterogeneity measure and $p$ the percentage of TMT members in each of the $i$ categories:

- Categories of educational level: 4 (1 = no higher/university studies; 2 = higher/university studies, such as bachelor's degree; 3 = master's degree or similar; 4 = PhD)
- Categories of educational background (Hambrick, Cho, and Chen, 1996): 8 (1 = engineering, 2 = science, 3 = business administration, 4 = economics, 5 = liberal arts, 6 = law, 7 = accounting and finance, 8 = other)
- Categories of functional background (Hambrick, Cho, and Chen, 1996): 16 (1 = CEO (chief executive officer), 2 = COO (chief operations officer), 3 = finance/treasurer, 4 = planning, 5 = personnel, 6 = public affairs, 7 = general counsel/secretary, 8 = operations/field service, 9 = marketing/sales/customer service, 10 = information system, 11 = international, 12 = maintenance/field service, 13 = general management, 14 = other corporate staff, 15 = accounting/controller, 16 = other)
- Categories of functional background (Westphal and Bednar, 2005): 3 (1 = throughput functions (engineering, operations, or research and development), 2 = output functions (marketing or sales), 3 = peripheral functions (finance and law)
- Categories of gender = 2 (1 = male, 2 = female)

Heterogeneity of firm tenure in a TMT is measured as the standard deviation of firm tenure divided by the average level of firm tenure in the team (Finkelstein and Hambrick, 1996; Kor, 2003).

**Managerial social capital**

Managerial social capital involves managers' abilities to access resources through relationships and connections (Adler and Kwon, 2002). There are two main types of social capital: internal and external, and each one brings different strengths to the team (Tian, Haleblian, and Rajagopalan, 2011). We define internal social capital in terms of the board's co-working experience. Consistent with previous research (Barkema and Shvyrkov, 2007; Tian, Haleblian, and Rajagopalan, 2011), a TMT's co-working experience is calculated as the overlap in executive directors' team tenures based on the following formula:

$$tenure\ overlap = \frac{1}{n}\sum_{ij} \min(u_i u_j),$$

where *ui* is the team tenure of the *i*th executive and *n* is the number of pairwise comparisons.

External social capital leads to access to external resources. Frequently, external ties have been operationalized in the form of directorships of other companies (interlocks) by strategy researchers evaluating the social capital of managers. We measure external social capital through the interlocks which executives hold in other companies. We distinguish if they are held in the same or in different sectors by the NACE code.

We introduce the following variables as managerial social capital variables:

- Internal social capital: tenure overlap is worked out using the formula of tenure overlap explained above
- External social capital is measured by interlocks, which are directorships of other companies in the same or different sectors (NACE code)

**Managerial cognition**

Shared prior experience enables TMTs to make quick and unified strategic decisions (Kor and Misangyi, 2008). The prior shared experience and background characteristic of managers have served as an observable proxy for unobservable cognitive-mental models (Townsend and Busenitz, 2014). We consider the 10 years previous to the registration of the company and check the shared experience of TMT members. The number of years of shared prior experience has been calculated by pair comparison as the sum of the minimum ($u_{itk}$,$u_{jtk}$) where $u_{itk}$ is the tenure of the executive *i* in the *t* period in the firm *k*, and $u_{jtk}$ is the tenure of the executive *j* in the same period (*t*) and in the same company (*k*). We also consider the number of the companies where the executives have coincided and the number of previous links among these executives.

We introduce the concept of pre-tenure overlap. Following the work of Zheng (2012), pre-tenure overlap has been calculated by the following formula:

$$pre-tenure\ overlap = \frac{1}{n_{it}\ \frac{n_{it}-1}{2}} \sum \min(u_{itk}; u_{jtk}),$$

where $n_{it}$ is the size of the TMT (company *i*; period *t*), $u_{itk}$ is the tenure of the executive *i* in the *t* period and *k* firm, and $u_{jtk}$ is the tenure of the executive *j* in the same period (*t*) and in the same company (*k*).

The managerial cognition variables are the following:

- Number of years of prior shared experience
- Number of previous co-working companies
- Pre-tenure overlap
- Number of previous links

### 4.3.2 Exploratory factor analysis

We conducted an exploratory factor analysis in order to develop each DMCs' underpinnings. The method used is principal factors, because the factors are linear combinations that maximize the shared portion of the underlying variance (latent

constructs). Varimax-orthogonal rotation is used, for practical reasons as this provides the easiest interpretation and the easiest scoring rules or interpretation of factor scores. Also, Kaiser Normalization has been applied.

All variables with unique variance (uniqueness = 1 - communality) over 0,7 are not considered in the analysis, because the greater the uniqueness, the lower the relevance of the variable in the factor model. This is the case of gender heterogeneity: 0,9851, number of nationalities:0,9315, firm tenure heterogeneity: 0,8485, depth experience in other industries: 0,7122, and % of TMT members with studies linked to functional areas: 0,7021.

Moreover, we not consider those variables with scores of less than 0,5. For instance, in one case the score for the number of countries where members of a TMT have worked is 0,15.

Through being rigorous with the factor analysis requirements, we lost international experience variables. As a result, the definitive variables used in the factor analysis are:

**Managerial human capital**

**Knowledge:**

- Level of knowledge
- % of members of a TMT with a master's degree or PhD studies

**Professional experience: depth and breadth**

**Depth of experience**

- Depth of experience in the firm: number of years worked in the firm
- Depth of experience in the corporate group: number of years of worked in the corporate group
- Depth of experience in the industry: number of years worked in the industry (by NACE code)
- Depth of general experience: total number of years worked

**Breadth of experience**

- Breadth of experience in the corporate group: number of companies belonging to the corporate group where TMT members have worked
- Breadth of experience in the industry: number of companies belonging to the same industry where TMT members have worked (by NACE code)
- Breadth of general experience: total number of companies where TMT members have worked

**Entrepreneurial experience**

- **N**umber of companies founded by the TMT (mean)
- **N**umber of founders in the TMT (mean)
- **N**umber of years of experience of TMT members as founders (considering a peak of six years for each new company founded)

**Heterogeneity**

- Heterogeneity of educational level
- Heterogeneity of educational background
- Heterogeneity of functional background (Westphal and Bednar, 2005)
- Heterogeneity of functional background (Hambrick, Cho, and Chen, 1996)

**Managerial social capital: internal and external**

We introduce the following variables as managerial social capital variables:

- Internal social capital: tenure overlap is worked out using the formula of tenure overlap explained above
- External social capital is measured by interlocks, which are directorships of other companies in the same or different sectors (by NACE code)

**Managerial cognition**

Finally, the managerial cognition variables are the following:

- **N**umber of years of prior shared experience
- **N**umber of previous co-working companies

- Pre-tenure overlap
- **N**umber of previous links

We retained the first six factors, due to the value of their eigenvalue being over 1.

**Table 4.2. Un-rotated factor analysis**

| **Factor analysis / correlation** | | | **Number of observations = 969** | |
|---|---|---|---|---|
| Method: principal factors | | | Factors retained = 14 | |
| Rotation: unrotated | | | Number of parameters = 245 | |
| **Factor** | **Eigenvalue** | **Difference** | **Proportion** | **Cumulative** |
| **Factor 1** | **4,88645** | **2,17419** | **0,3088** | **0,3088** |
| **Factor 2** | **2,71227** | **0,32064** | **0,1714** | **0,4802** |
| **Factor 3** | **2,39162** | **0,46283** | **0,1511** | **0,6314** |
| **Factor 4** | **1,92879** | **0,45636** | **0,1219** | **0,7533** |
| **Factor 5** | **1,47243** | **0,20017** | **0,0931** | **0,8463** |
| **Factor 6** | **1,27226** | **0,42749** | **0,0804** | **0,9267** |
| Factor 7 | 0,84477 | 0,30296 | 0,0534 | 0,9801 |
| Factor 8 | 0,54181 | 0,1738 | 0,0342 | 1,0144 |
| Factor 9 | 0,36802 | 0,02672 | 0,0233 | 1,0376 |
| Factor 10 | 0,34129 | 0,13908 | 0,0216 | 1,0592 |
| Factor 11 | 0,20221 | 0,12623 | 0,0128 | 1,072 |
| Factor 12 | 0,07598 | 0,05113 | 0,0048 | 1,0768 |
| Factor 13 | 0,02485 | 0,0136 | 0,0016 | 1,0783 |
| Factor 14 | 0,01125 | 0,05927 | 0,0007 | 1,079 |
| Factor 15 | -0,04802 | 0,02554 | -0,003 | 1,076 |
| Factor 16 | -0,07356 | 0,01361 | -0,0046 | 1,0714 |
| Factor 17 | -0,08717 | 0,01066 | -0,0055 | 1,0659 |
| Factor 18 | -0,09783 | 0,01118 | -0,0062 | 1,0597 |
| Factor 19 | -0,10901 | 0,02556 | -0,0069 | 1,0528 |
| Factor 20 | -0,13457 | 0,01923 | -0,0085 | 1,0443 |
| Factor 21 | -0,1538 | 0,01211 | -0,0097 | 1,0346 |
| Factor 22 | -0,16591 | 0,01358 | -0,0105 | 1,0241 |
| Factor 23 | -0,17949 | 0,02189 | -0,0113 | 1,0127 |
| Factor 24 | -0,20138 | | -0,0127 | 1 |
| LR test: independent vs. saturated: $chi^2(276) = 15000$ Prob > $chi^2 = 0$ | | | | |

**Table 4.3. Orthogonal varimax rotation and Kaiser normalization**

| **Factor analysis / correlation** | | | **Number of observations = 969** | |
|---|---|---|---|---|
| Method: principal factors | | | Factors retained = 6 | |
| Rotation: Orthogonal varimax (Kaiser on) | | | Number of parameters = 129 | |
| **Factor** | **Variance** | **Difference** | **Proportion** | **Cumulative** |
| **Factor 1** | 3,19896 | 0,32805 | 0,2022 | 0,2022 |
| **Factor 2** | 2,87090 | 0,28147 | 0,1814 | 0,3836 |
| **Factor 3** | 2,58943 | 0,30920 | 0,1636 | 0,5473 |
| **Factor 4** | 2,28023 | 0,14183 | 0,1441 | 0,6914 |
| **Factor 5** | 2,13841 | 0,55252 | 0,1351 | 0,8265 |
| **Factor 6** | 1,58589 | | 0,1002 | **0,9267** |
| LR test: independent vs. saturated: $chi^2(276) = 15000$ Prob > $chi^2 = 0$ | | | | |

The variance explained by the model is 92,67% (Table 4.3.).

**Table 4.4. Exploratory factorial analysis (EFA)**

| **Variable** | **Factor 1** | **Factor 2** | **Factor 3** | **Factor 4** | **Factor 5** | **Factor 6** | **Uniqueness** |
|---|---|---|---|---|---|---|---|
| Level of knowledge | 0,0107 | -0,0389 | 0,0356 | -0,0347 | -0,0518 | **0,8570** | 0,2587 |
| % Postgrad studies | -0,0090 | -0,0377 | 0,0840 | -0,1152 | -0,0453 | **0,8628** | 0,2316 |
| Depth exp. in firm | **0,8761** | -0,1155 | -0,0877 | 0,0656 | 0,0903 | 0,0714 | 0,1939 |
| Depth exp. in group | **0,7371** | 0,3063 | 0,1475 | 0,0147 | 0,0283 | -0,0954 | 0,3310 |
| Depth exp. in industry | **0,7468** | 0,1565 | 0,1738 | -0,0863 | 0,0040 | -0,0436 | 0,3782 |
| Depth exp. in general | **0,6918** | 0,2585 | 0,2317 | -0,0294 | 0,0561 | -0,0506 | 0,3944 |
| Tenure overlap | **0,8113** | -0,0406 | -0,1110 | 0,1928 | 0,1123 | 0,0965 | 0,2687 |
| Breadth exp. in group | 0,2326 | 0,2874 | **0,5756** | 0,1211 | -0,0178 | -0,0923 | 0,5084 |
| Breadth exp. in industry | 0,1775 | 0,1969 | **0,7800** | 0,0781 | -0,0605 | -0,0454 | 0,3095 |
| Breadth exp. in general | 0,0540 | 0,253 | **0,8046** | 0,1149 | 0,0532 | 0,0332 | 0,2685 |
| Interlocks in same industry | 0,0117 | -0,0283 | **0,6294** | 0,0132 | -0,0266 | 0,0448 | 0,6001 |
| Interlocks in diff. industry | -0,0640 | 0,0091 | **0,5795** | 0,0505 | 0,0577 | 0,1088 | 0,6423 |
| Nº of NVs founded | 0,0011 | 0,0594 | -0,0120 | -0,0509 | **0,8859** | 0,0265 | 0,2082 |
| Nº of founders in TMT | 0,1027 | 0,2465 | 0,0214 | -0,0778 | **0,6606** | -0,0731 | 0,4804 |
| Years exp. as founder | 0,1307 | 0,1001 | 0,0140 | -0,1043 | **0,8918** | -0,0649 | 0,1623 |
| Het. edu. level | -0,0041 | -0,0255 | 0,1078 | **0,6048** | -0,0530 | -0,1180 | 0,6052 |
| Het. edu. background | 0,0135 | 0,1438 | 0,1312 | **0,6852** | -0,1134 | -0,1458 | 0,4583 |
| Het. func. background (W) | 0,0727 | -0,0498 | 0,0188 | **0,7792** | -0,0504 | 0,0569 | 0,3790 |
| Het. func. background (H) | 0,0348 | 0,0514 | 0,0313 | **0,8310** | -0,0080 | 0,0441 | 0,3026 |
| Prior shared experience | 0,1904 | **0,8891** | 0,1822 | 0,0312 | 0,0430 | -0,0562 | 0,1340 |
| Nº of companies co-working | 0,0282 | **0,7730** | 0,2129 | 0,042 | 0,1633 | 0,0011 | 0,3279 |
| Pre-tenure overlap | 0,0241 | **0,6604** | -0,0453 | -0,0598 | 0,1663 | -0,0058 | 0,5300 |
| Previous links | 0,1835 | **0,7040** | 0,2210 | 0,1224 | 0,0482 | -0,0490 | 0,4022 |

**Table 4.5. Factor rotation matrix**

| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 |
|---|---|---|---|---|---|---|
| **Factor 1** | 0,5724 | 0,5968 | 0,4854 | 0,1745 | 0,2106 | -0,0762 |
| **Factor 2** | -0,2752 | -0,0533 | 0,4127 | 0,6402 | -0,5841 | -0,0038 |
| **Factor 3** | 0,7466 | -0,4414 | -0,3304 | 0,2851 | -0,2328 | 0,0557 |
| **Factor 4** | 0,1568 | -0,1509 | 0,4361 | -0,5360 | -0,3433 | 0,5978 |
| **Factor 5** | -0,1061 | -0,2910 | 0,1536 | 0,4067 | 0,6272 | 0,5671 |
| **Factor 6** | -0,0582 | 0,5820 | -0,5207 | 0,1604 | -0,2214 | 0,5587 |

### 4.3.3 Description of the factors

**F1: Internal social capital (depth of experience and tenure overlap)**

The variables which load on F1 are: depth of experience in the firm; depth of experience in the corporate group; depth of experience in the industry; depth of general experience; and tenure overlap. A review of the literature confirms that many researchers consider human and social capital together to be a whole (Geletkanycz, Boyd, and Finkelstein, 2001; Adner and Helfat, 2003; Nielsen, 2015). Certainly, professional experience in the same firm, group and industry becomes a source of internal social capital.

**F2: Managerial cognition (shared prior experience)**

Variables which load on F2 are: prior shared experience, number of companies co-working, pre-tenure overlap, and previous links. Clearly, managerial cognition is the meaning of Factor 2. As we discuss in Chapter 2, shared prior experience is quite common in the case of NVs. A common professional background enables TMTs to make quick and unified strategic decisions, which can be advantageous for effective performance in turbulent industry environments (Baum and Wally, 2003; Eisenhardt and Schoonhoven, 1990; Kor, 2003). Prior shared experience enables founding teams to effectively and efficiently integrate their members' expertise and skills, and increase the cohesion of the team (Zheng, 2012).

**F3: External social capital (breadth of experience and interlocks)**

The variables which load on F3 are: breadth of experience in the corporate group, breadth of experience in the industry, breadth of general experience, interlocks in the same industry, and interlocks in other industries. We give the name “external social capital” to F3 because of the link between the companies where TMT members have worked and the interlocks that these members hold. These interlocks lead to access to

external resources (Wincent, Anokhin, and Örtqvist, 2010). Clearly, those executives who worked in a large number of companies and maintained their relationships with those companies became valuable resources for the firm (Adner and Helfat, 2003).

**F4: TMT heterogeneity**

Variables which load on F4 are: heterogeneity of education level, heterogeneity of education background, heterogeneity of functional background following the Westphal (2005) classification, and heterogeneity of functional background following the Hambrick (1996) classification. Heterogeneity has been analyzed as source of human capital, social capital, and cognition. The managerial human capital framework provides a means to assess heterogeneity in managerial skills. Managers may differ in both the mix of their skills and in their level of ability for each type of skill (Adner and Helfat, 2003). Li (2013) uses TMT diversity as a proxy for a TMT's social capital. The research concludes that TMT diversity measured as the reverse of the overlap measure of the team's prior affiliations is critical for NVs being able to identify and capture alliance opportunities.

**F5: Entrepreneurial capital**

Variables which load on F5 are: number of NVs founded by TMT members, number of founders belonging to a TMT, and years of experience as founders. By examining entrepreneurial experience, we focus on a type of experience that is of considerable interest for the study of NVs' performance. In fact, prior entrepreneurial experience positively correlates with the early performance of NVs (Stuart and Abetti, 1990). As the literature review in Chapter 2 shows us, entrepreneurial experience has been one of the most frequent variables studied in the context of managerial capabilities in NVs.

**F6: Knowledge**

Variables which load on F6 are: level of knowledge with a range from 1 (no higher/university studies) to 4 (PhD studies), and % of TMT members who hold postgraduate studies. Knowledge is one of the main attributes studied in the context of human capital. In the case of NVs, the level of education of the founders is positively associated with firm growth and survival (Cooper, Woo, and Dunkelberg, 1989; Bates, 1990).

### 4.3.4 Time stability analysis

This thesis implies a longitudinal study of 126 NVs during their first 10 years of activity. In spite of this fact, the factor analysis outlined above has been run as a pool set of data. We rule out running a dynamic factor analysis because to identify hidden trends is not the goal of this thesis. Thus, to confirm time stability in our identified factors, we annually run the same analysis, and the results show us that the number of factors is stable over time and that the variables load on the same factors.

**Table 4.6. Time stability analysis**

| Stage | Age of firm | Observations | Factors | Cumulative variance |
|---|---|---|---|---|
| 1 | 0-1 | 213 | 6 | 91% |
| 2 | 2-3 | 240 | 6 | 89% |
| 3 | 4-5 | 218 | 6 | 90% |
| 4 | 6-7 | 196 | 6 | 92% |
| 5 | 8-9 | 102 | 6 | 91% |

### 4.3.5 Reliability analysis

The Cronbach α analysis determines the reliability of each factor in terms of the internal consistency of every dimension. Reliability statistics α - Cronbach are shown in Tables 4.7. to 4.12. All of them are over 0,8, and hence the internal consistency of F1, F2, F3, F4, F5 and F6 is guaranteed.

**Table 4.7. F1: Internal social capital reliability statistics**

| F1: Internal social capital | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Obs.** | **Sign** | **Item-test correlation** | **Item-rest correlation** | **Average inter-item correlation** | **Alpha** |
| Depth exp. in firm | 1021 | + | 0,8551 | 0,7618 | 0,5822 | 0,8479 |
| Depth exp. in group | 1021 | + | 0,8259 | 0,7198 | 0,6011 | 0,8577 |
| Depth exp. in ind. | 1017 | + | 0,8424 | 0,7447 | 0,5901 | 0,8521 |
| Depth exp. in general | 971 | + | 0,8060 | 0,6871 | 0,6186 | 0,8665 |
| Tenure overlap | 1029 | + | 0,8088 | 0,6894 | 0,6147 | 0,8645 |
| **Test scale** | | | | | **0,6015** | **0,8830** |

**Table 4.8. F2: Managerial cognition reliability statistics**

| F2: Managerial cognition | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Obs.** | **Sign** | **Item-test correlation** | **Item-rest correlation** | **Average inter-item correlation** | **Alpha** |
| Prior shared experience | 1029 | + | 0,924 | 0,853 | 0,5028 | 0,7521 |
| Nº companies co-working | 1029 | + | 0,8801 | 0,7745 | 0,5518 | 0,7869 |
| Pre-tenure overlap | 1029 | + | 0,7574 | 0,5747 | 0,6887 | 0,8691 |
| Previous links | 1029 | + | 0,7855 | 0,6182 | 0,6573 | 0,852 |
| **Test scale** | | | | | **0,6002** | **0,8572** |

**Table 4.9. F3: External social capital reliability statistics**

| F3: External social capital | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Obs.** | **Sign** | **Item-test correlation** | **Item-rest correlation** | **Average inter-item correlation** | **Alpha** |
| Breadth exp. in group | 1029 | + | 0,6941 | 0,5123 | 0,5024 | 0,8015 |
| Breadth exp. in ind. | 1029 | + | 0,8478 | 0,7399 | 0,4056 | 0,7319 |
| Breadth exp. in general | 1029 | + | 0,873 | 0,7802 | 0,3898 | 0,7187 |
| Interlocks in same ind. | 1029 | + | 0,6991 | 0,5192 | 0,4993 | 0,7995 |
| Interlocks in diff. ind. | 1029 | + | 0,664 | 0,4711 | 0,5214 | 0,8133 |
| **Test scale** | | | | | **0,4637** | **0,8121** |

**Table 4.10. F4: Heterogeneity reliability statistics**

| F4: Heterogeneity | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Obs.** | **Sign** | **Item-test correlation** | **Item-rest correlation** | **Average inter-item correlation** | **Alpha** |
| Het. edu. level | 1021 | + | 0,7589 | 0,5692 | 0,6016 | 0,8192 |
| Het. edu. background | 1021 | + | 0,8205 | 0,6675 | 0,5349 | 0,7753 |
| Het. func. back. (W) | 1021 | + | 0,8072 | 0,6456 | 0,5494 | 0,7853 |
| Het. func. back. (H) | 1021 | + | 0,8594 | 0,7332 | 0,4929 | 0,7446 |
| **Test scale** | | | | | **0,5447** | **0,8271** |

**Table 4.11. F5: Entrepreneurial capital reliability statistics**

| F5: Entrepreneurial capital | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Obs.** | **Sign** | **Item-test correlation** | **Item-rest correlation** | **Average inter-item correlation** | **Alpha** |
| Nº NVs founded | 1021 | + | 0,9152 | 0,8029 | 0,6458 | 0,7848 |
| Nº founders in TMT | 1021 | + | 0,8372 | 0,6475 | 0,8553 | 0,9220 |
| Years exp. as founder | 1021 | + | 0,9318 | 0,8388 | 0,6014 | 0,7511 |
| **Test scale** | | | | | **0,7008** | **0,8754** |

**Table 4.12. F6: Knowledge reliability statistics**

| F6: Knowledge | |
|---|---|
| **Variables** | **Level of knowledge and % postgraduate studies** |
| Number of items in the scale | 2 |
| Average inter-item correlation | 0,8057 |
| **Scale reliability coefficient** | **0,8924** |

### 4.3.6 Convergent and discriminant validity

We can affirm that our measurements have convergent validity if measures of constructs that theoretically should be related to each other are, in fact, observed to be related to each other. Thus, as Table 4.13. shows us, each factor is shaped by interrelated variables. Moreover, as Adner and Helfat (2003) announced, experience is the basis of all the attributes of DMCs. Depth of experience loads on internal social capital, breadth of experience loads on external social capital, prior shared experience sets managerial cognition, entrepreneurial experience is the basis of entrepreneurial capital, all heterogeneities load on the same factor, and finally we have F6: Knowledge that is shaped by two educational variables: level and the proportion of TMT members with postgraduate studies, which is a key component of managerial human capital.

With regard to discriminant validity, we can affirm that our measurements have discriminant validity if measures of constructs that theoretically should not be related to each other are, in fact, observed to not be related to each other. Thus, as Table 4.13. shows us, each variable loads on one factor only (the higher score has only one factor).

**Table 4.13. Discriminant and convergent validity**

| Variable | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Uniqueness |
|---|---|---|---|---|---|---|---|
| **Knowledge** | | | | | | | |
| Level of knowledge | | | | | | **0,8570** | 0,2587 |
| % with postgrad. studies | | | | | | **0,8628** | 0,2316 |
| **Internal social capital** | | | | | | | |
| Depth exp. in firm | **0,8761** | | | | | | 0,1939 |
| Depth exp. in group | **0,7371** | | | | | | 0,3310 |
| Depth exp. in ind. | **0,7468** | | | | | | 0,3782 |
| Depth exp. in general | **0,6918** | | | | | | 0,3944 |
| Tenure overlap | **0,8113** | | | | | | 0,2687 |
| **External social capital** | | | | | | | |
| Breadth exp. in group | | | **0,5756** | | | | 0,5084 |
| Breadth exp. in ind. | | | **0,7800** | | | | 0,3095 |
| Breadth exp. in general | | | **0,8046** | | | | 0,2685 |
| Interlocks in same ind. | | | **0,6294** | | | | 0,6001 |
| Interlocks in diff. ind. | | | **0,5795** | | | | 0,6423 |
| **Entrepreneurial capital** | | | | | | | |
| Nº NVs founded | | | | | **0,8859** | | 0,2082 |
| Nº founders in TMT | | | | | **0,6606** | | 0,4804 |
| Years exp. as founder | | | | | **0,8918** | | 0,1623 |
| **Heterogeneity** | | | | | | | |
| Het. edu. level | | | | **0,6048** | | | 0,6052 |
| Het. edu. background | | | | **0,6852** | | | 0,4583 |
| Het. func. back. (W) | | | | **0,7792** | | | 0,3790 |
| Het. func. back. (H) | | | | **0,8310** | | | 0,3026 |
| **Managerial cognition** | | | | | | | |
| Prior shared experience | | **0,8891** | | | | | 0,1340 |
| Nº companies co-working | | **0,7730** | | | | | 0,3279 |
| Pre-tenure overlap | | **0,6604** | | | | | 0,5300 |
| Previous links | | **0,7040** | | | | | 0,4022 |

(Blanks represent abs. (loading) <0,5)

### 4.4. DMCs' underpinnings

#### 4.4.1 Managerial human capital

**F6: Knowledge**

Our empirical setting is composed of fast-growing NVs. TMTs with a high level education will improve the performance of firms. Figure 4.1. shows the distribution of the original variables of F6: Knowledge, and Figure 4.2. shows the distribution of F6. The range of level of knowledge extends from 1 (no higher/university studies) to 4 (PhD studies). We can see (Figure 4.1.) that the level of studies of the teams is close to 2,5, that is to say between higher/university studies and master's degree or postgraduate studies. The range of % of postgraduate studies is from 0 to 1, and so we can see that 50% of team members hold higher/university studies.

**Figure 4.1. Original variables of F6: Knowledge by year of the firm**

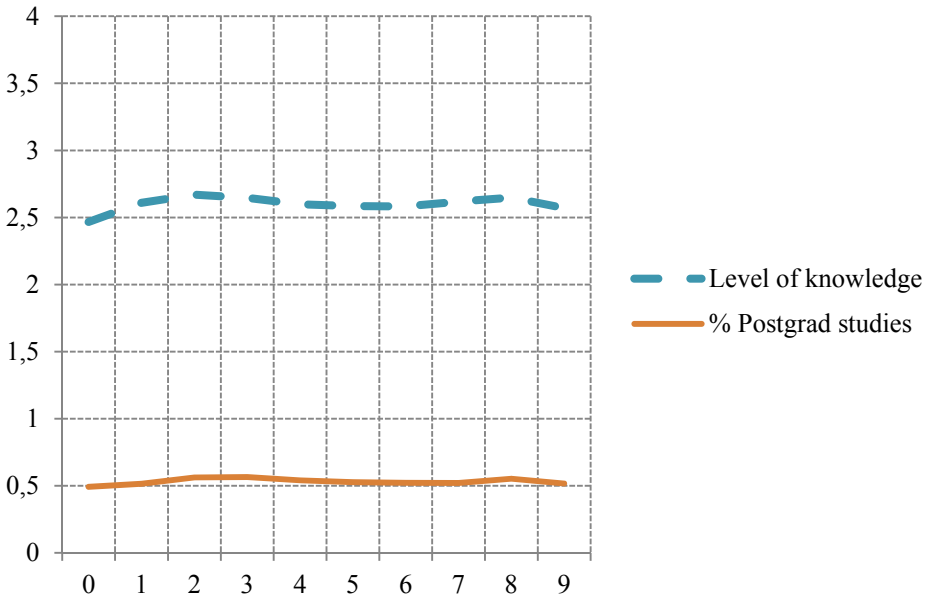
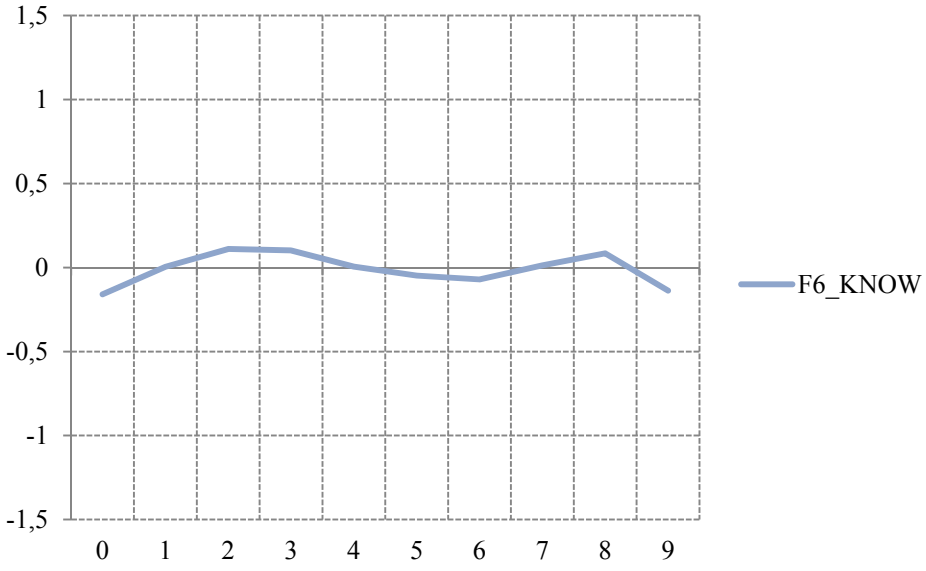


**Figure 4.2. Distribution of F6: Knowledge by year of the firm**




**F5: Entrepreneurial capital**

Entrepreneurial capital has been widely analyzed in the context of NVs. Figure 4.3. shows the distribution of original variables of F5: Entrepreneurial capital, and Figure 4.4 shows the distribution of F5. Years of experience as a founder measure entrepreneurial experience, but they are bound by an upper limit of six years. Both the number of founders in a TMT (mean) and the number of companies founded by them (mean) show a decreasing trend over time.

**Figure 4.3. Original variables of F5: Entrepreneurial capital by year of the firm**

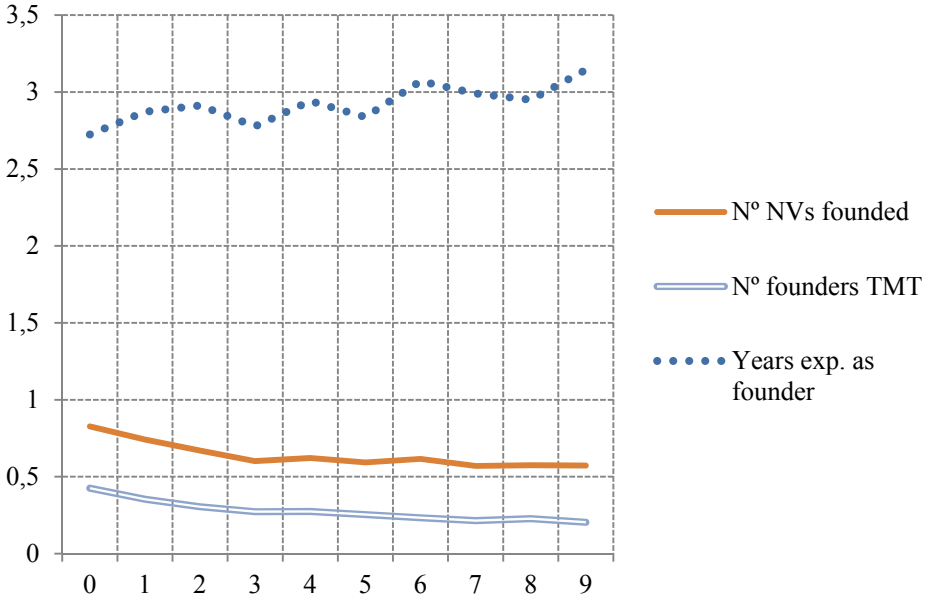
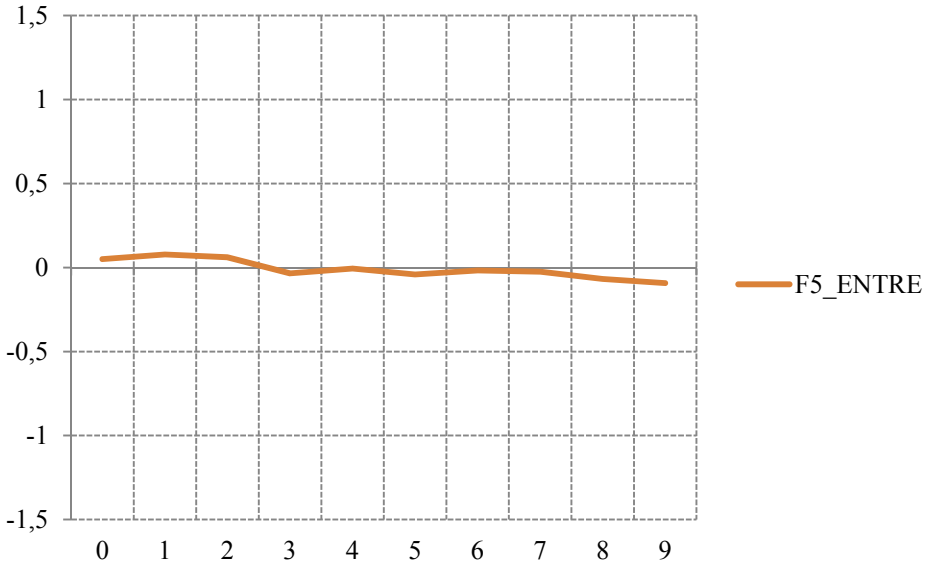


**Figure 4.4. Distribution of F5: Entrepreneurial capital by year of the firm**




**F4: Heterogeneity**

Heterogeneity is a variable analyzed in human capital, social capital and even in the context of cognition. The Herfindal-Hirschman Index extends from 0 (homogenous teams) to 1 (heterogeneous teams). Figure 4.5. shows the distribution of the original variables of F4: Heterogeneity, and Figure 4.6. shows the distribution of F4. We can see that educational and functional (H) backgrounds have the highest level of heterogeneity. TMTs are more homogenous in level of education and functional background (W).

**Figure 4.5. Original variables of F4: Heterogeneity by year of the firm**

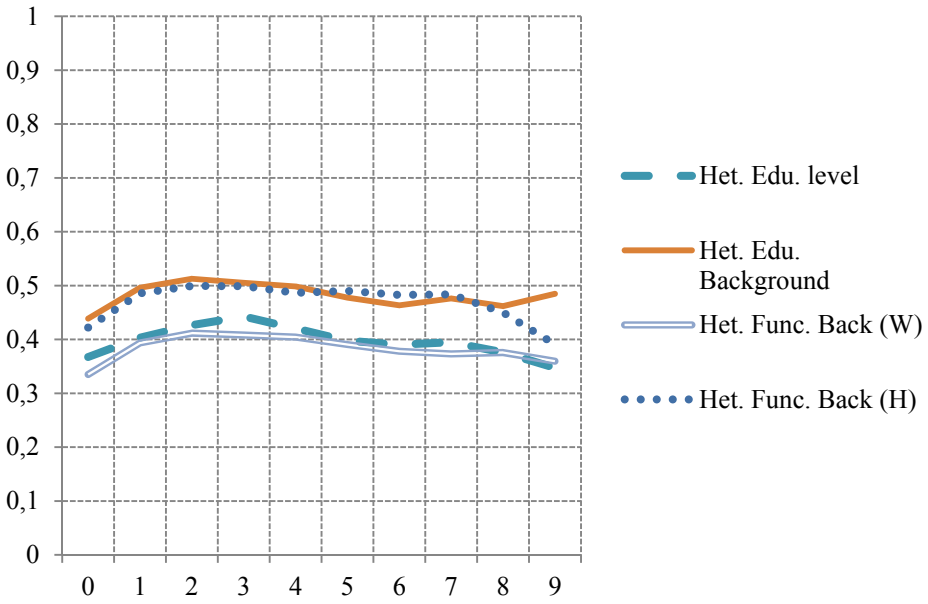
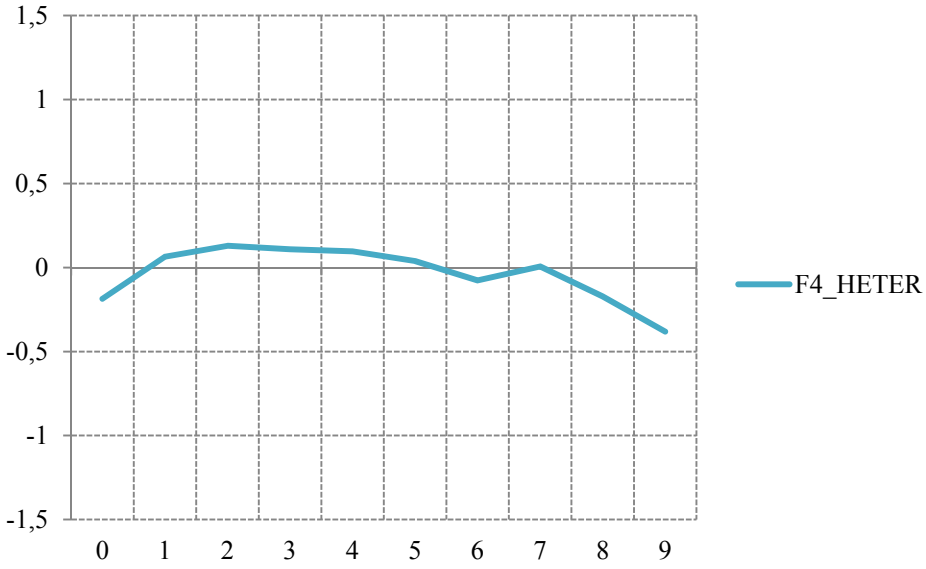


**Figure 4.6. Distribution of F4: Heterogeneity by year of the firm**




### 4.4.2 Managerial social capital

#### F1: Internal social capital

We define internal social capital in terms of the TMTs' co-working experience. Thus, in firms with stable TMTs, the distribution of original variables may show a trend that grows together with the age of the firm.

Figure 4.7. shows us the distribution of the original variables which shape F1: Internal social capital. Figure 4.8. shows the tendency of the factor.

**Figure 4.7. Original variables of F1: Internal social capital by year of the firm**

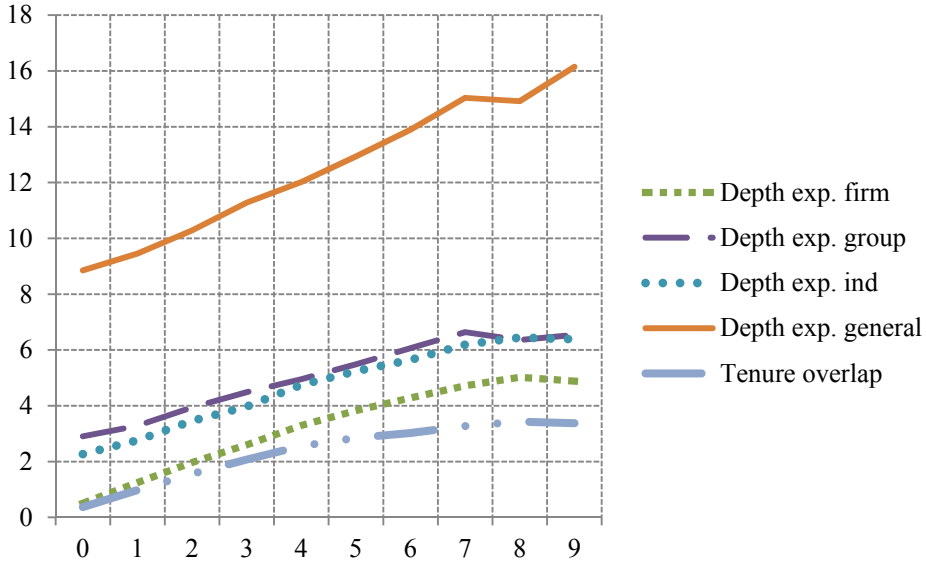
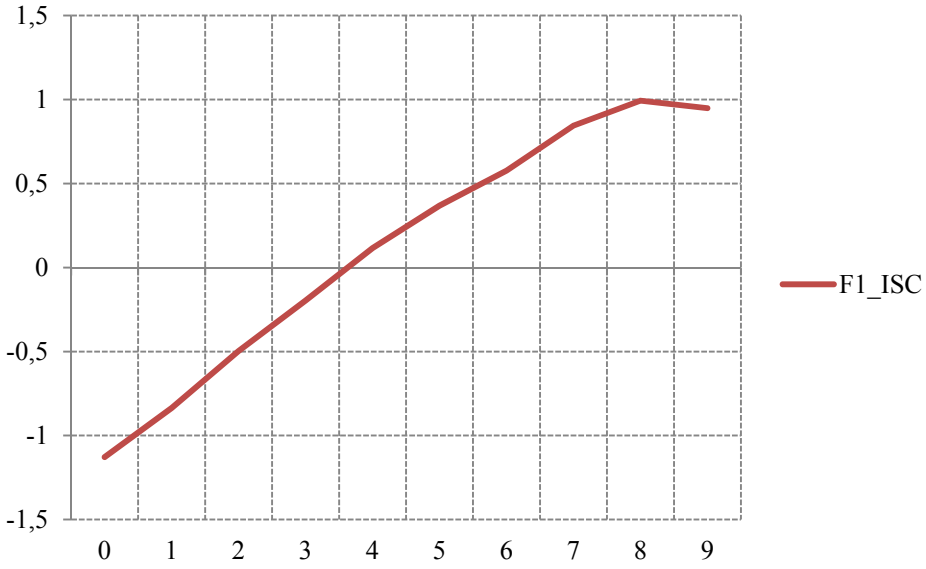


**Figure 4.8. Distribution of F1: Internal social capital by year of the firm**




### F3: External social capital

We can define external social capital as external links which lead executives to attract resources for the company. Directorships in other companies will increase the external social capital of the TMT. Figure 4.9. shows the distribution of the original variables of F3: External social capital, and Figure 4.10. shows the distribution of F3.

**Figure 4.9. Original variables of F3: External social capital by year of the firm**

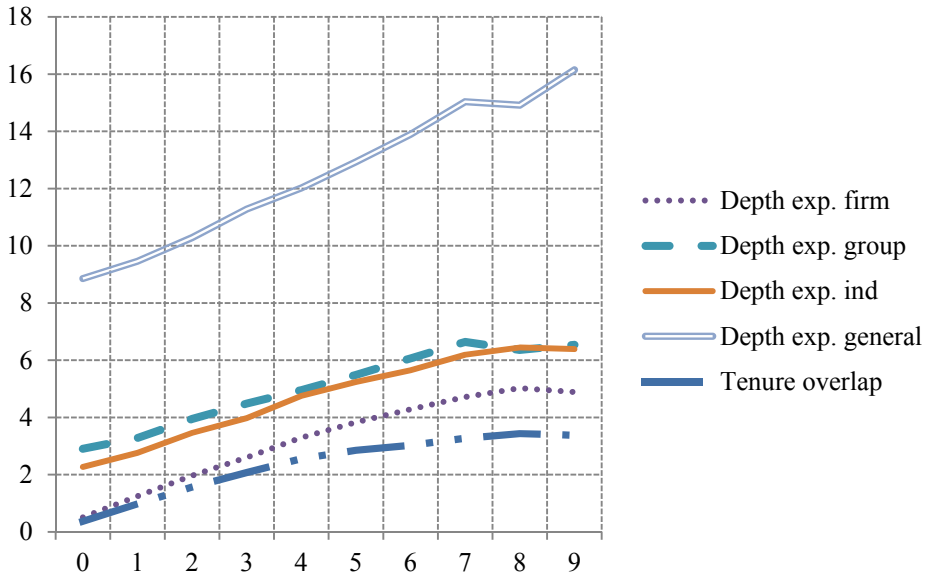
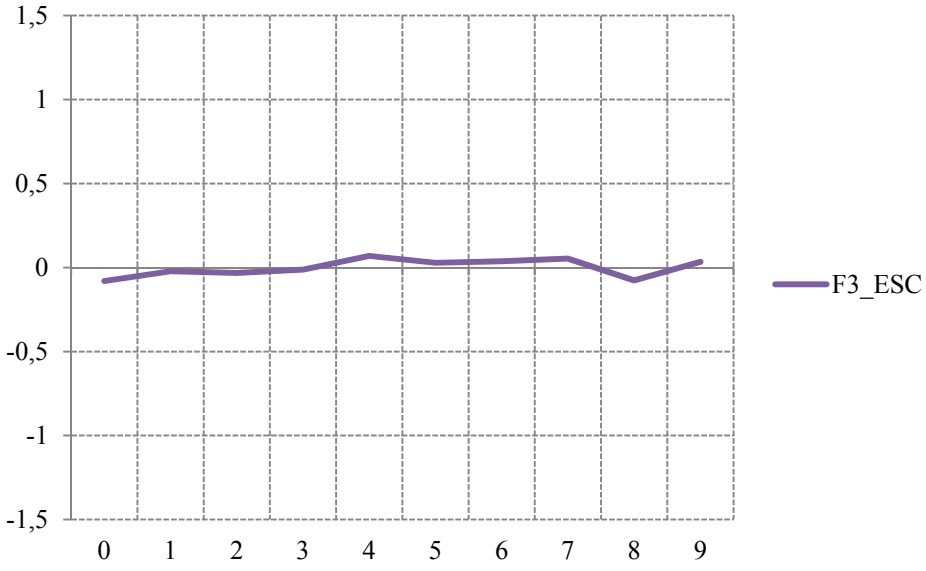


**Figure 4.10. Distribution of F3: External social capital by year of the firm**




### 4.4.3 Managerial cognition

We use prior shared experience as a proxy for managerial cognition. We believe that the context of NVs' shared prior experience is key for their survival and growth, particularly in the early years. Previous links become valuable resources for the founding team. Figure 4.11. shows the distribution of the original variables of F2: Managerial cognition, and Figure 4.12. shows the distribution of F2.

**Figure 4.11. Original variables of F2: Managerial cognition by year of the firm**

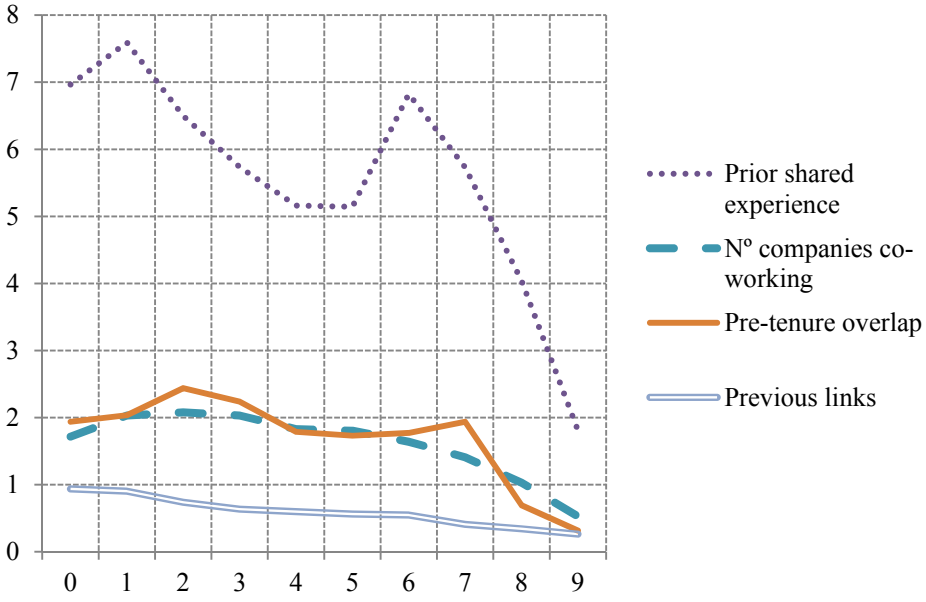


**Figure 4.12. Distribution of F2: Managerial cognition by year of the firm**

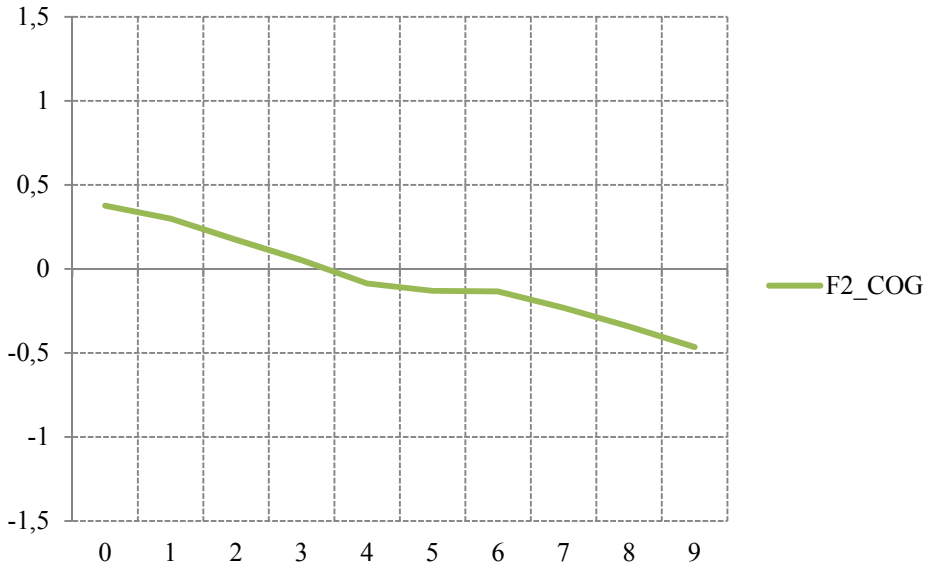
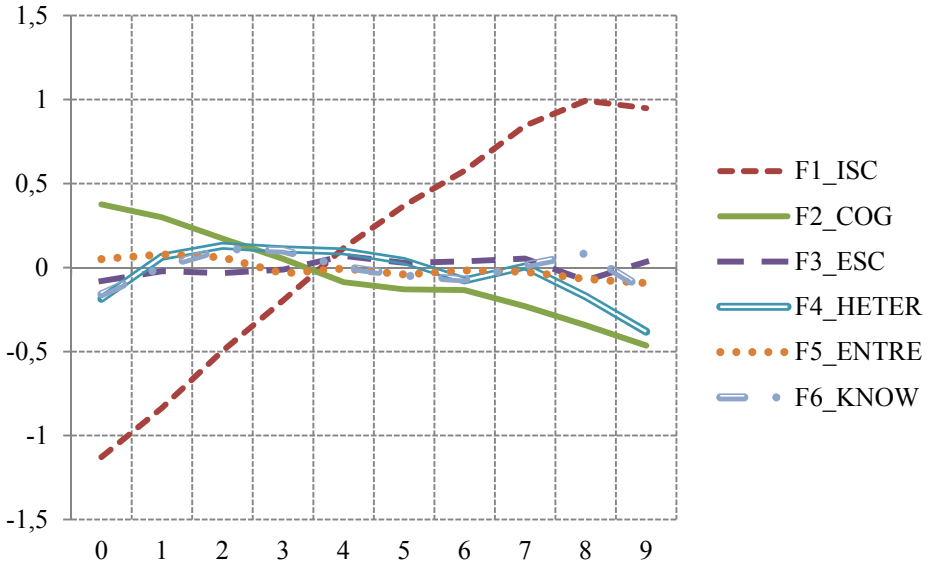


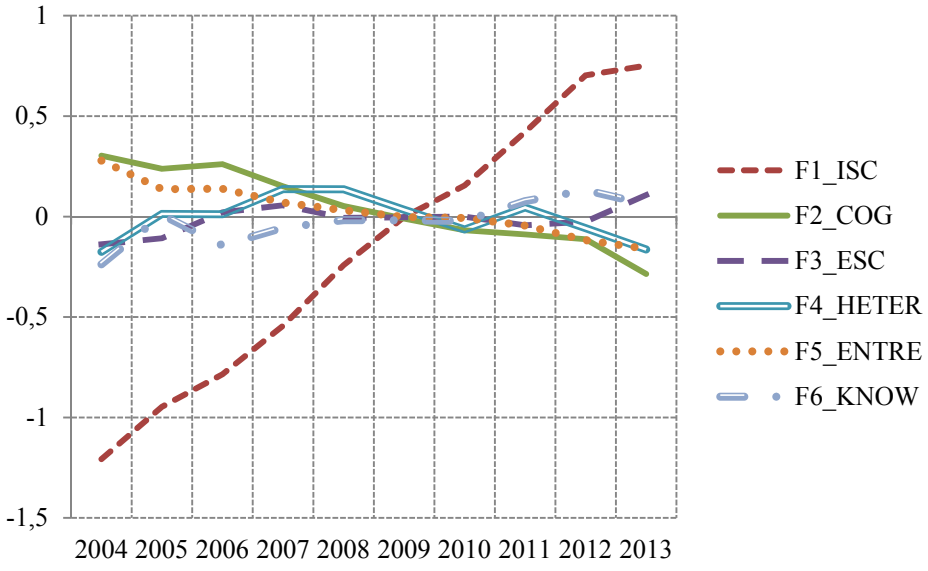

Figure 4.13. shows a general vision of the trend of all the underpinnings of the DMCs during the companies' first years of activity. Clearly, internal social capital shows a growing trend. In the first stage, teams do not have experience of working together, although stable teams increase their internal social capital over the course of time. Managerial cognition shows a decreasing trend. In the complicated initial stages of the firms, founding teams rely on former colleagues for synergy and the solving of problems. However, as the companies gain experience and the teams became more cohesive, these teams do not need to draw on previous relationships. External social capital, entrepreneurial capital, and knowledge maintain their stability over the course of time. With regard to heterogeneity, we can see how teams are more homogenous in the later years.

**Figure 4.13. DMCs' underpinnings by age of the firm**




By considering calendar years instead of the age of the firm, we appreciate the same trend in all the components (Figure 4.14.).

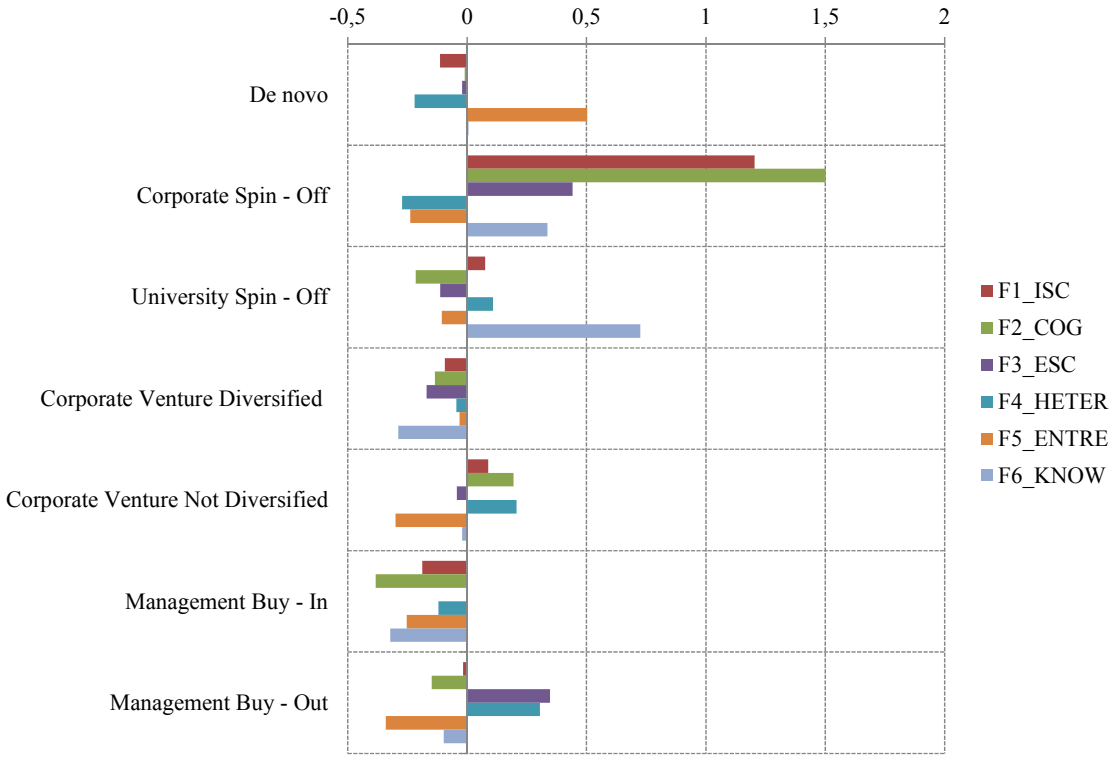
**Figure 4.14. DMCs' underpinnings by year**




In relation to the origin of the company (Figure 4.15.), in the case of independent NVs we appreciate that entrepreneurial capital is the highest attribute in De Novo companies, internal social capital and managerial cognition in Corporate Spin-Offs, and knowledge in University Spin-Offs. On the other hand, in the case of Corporate

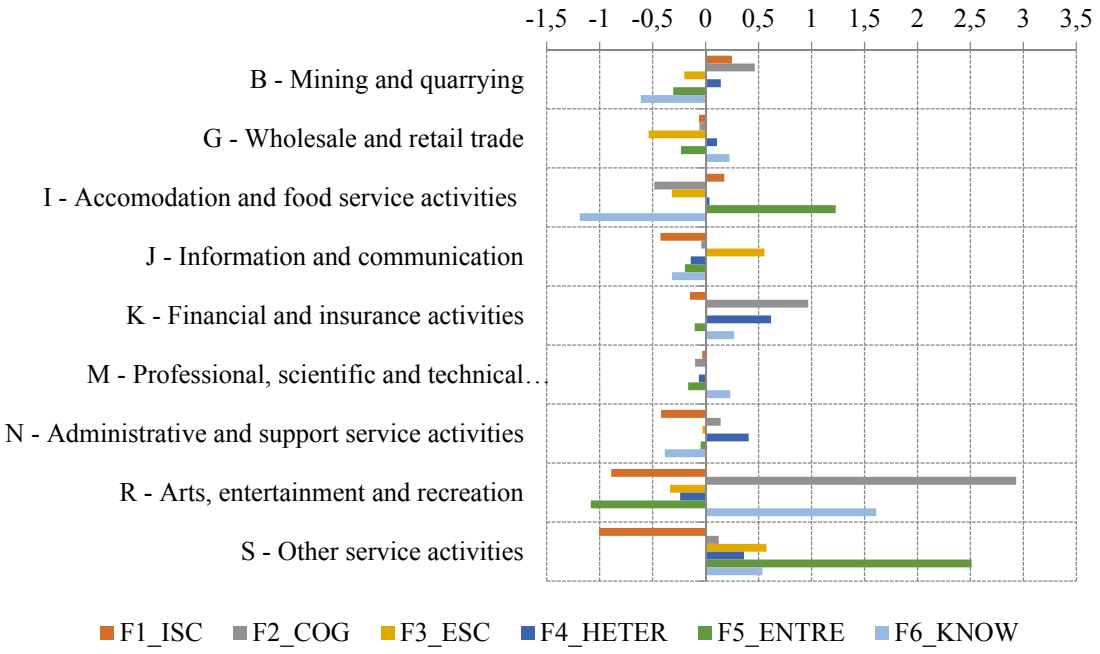
Ventures, when diversified they show the lowest level of DMC underpinnings, although when these Corporate Ventures are not diversified, entrepreneurial capital is at the lowest level in the category, and both managerial cognition and heterogeneity are at the highest. Management Buy-In companies also keep the levels of all the attributes low, and finally external social capital and heterogeneity stand out from the other attributes in the case of Management Buy-Outs.

**Figure 4.15. DMCs' underpinnings by origin of the firm**




In terms of the different sectors, we appreciate that at the lowest level is knowledge in I – Accommodation and food service activities (Figure 4.16.), followed by entrepreneurial capital in R – Arts, entertainment and recreation. Meanwhile, we can see that at the highest level is managerial cognition in the same sector (R), followed by entrepreneurial capital in S – Other service activities.

**Figure 4.16. DMCs' underpinnings by activity sector**




## 4.5. Conclusions

There are few previous works that measure DMCs in an explicit way, and even fewer in the context of NVs. We fill this research gap by offering a measurement of DMCs through an exploratory factor analysis. We gather human capital, social capital, and managerial cognition from the TMTs of 126 NVs that entered AIM during their two first years of activity. They are fast-growing NVs that need financial resources to keep growing. This is an optimal setting for measuring DMCs, those capabilities with which managers build, integrate, and reconfigure organizational resources and competences (Adner and Helfat, 2003).

We introduce as managerial human capital variables: 1. knowledge (level of knowledge; % of members of a TMT with a master's degree or PhD studies); 2. depth of experience (depth of experience in the firm = number of years worked in the firm; depth of experience in the corporate group = number of years worked in the corporate group; depth of experience in the industry = number of years worked in the industry (by NACE code); depth of general experience = total number of years worked); 3. breadth of experience (breadth of experience in the corporate group = number of companies belonging to a corporate group where TMT members have worked; breadth of experience in the industry = number of companies belonging to the same industry where

TMT members have worked (by NACE code); breadth of general experience = total number of companies where TMT members have worked); 4. entrepreneurial experience (number of companies founded by a TMT (mean); 5. number of founders in a TMT (mean); 6. number of years of experience of TMT members as founders (considering a peak of six years for each new company founded); and 7. heterogeneity (heterogeneity of educational level, heterogeneity of educational background, and heterogeneity of functional background (Westphal and Bednar, 2005); heterogeneity of functional background (Hambrick, Cho, and Chen, 1996)).

For managerial social capital, we introduce tenure overlap as internal social capital, and interlocks in the same and different sectors (by NACE code) as external social capital.

Finally, we include as managerial cognition variables: number of years of prior shared experience; number of previous co-working companies; pre-tenure overlap; and number of previous links.

The results show six factors with eigenvalues over 1, and the variance explained by the model is 92,67%. The meaning of the factors is:

- F1: Internal social capital (depth of experience and tenure overlap)
- F2: Managerial cognition (shared prior experience)
- F3: External social capital (breadth of experience and interlocks)
- F4: TMT heterogeneity
- F5: Entrepreneurial capital
- F6: Knowledge

We found a growing trend for internal social capital over the first 10 years of activity of the company. By contrast, managerial cognition shows a falling trend. An explanation may be that while in the first years TMTs need prior professional relationships to solve problems and obtain resources, once the team becomes cohesive, internal relationships among the executives became stronger and key.

The next step will be to analyze the influence of DMCs' underpinnings on the performance of the company in the context of NVs.

# CHAPTER 5: Dynamic managerial capabilities in new ventures. Influence on performance

**Abstract**

This paper aims to explore the key attributes of dynamic managerial capabilities (DMCs) in new ventures (NVs), and its implications for performance. DMCs are known as the capabilities with which managers build, integrate, and reconfigure organizational resources and competences (Adner and Helfat, 2003). Despite the importance of DMCs for a NV to achieve congruence between its competencies and changing environmental conditions, little is known about DMCs' in NVs, companies in their early years of existence.

The research provides a framework for measuring DMCs in NVs using a longitudinal data set comprising a sample of 126 service NVs that entered the Alternative Investment Market (AIM) from the London Stock Exchange during the period 2004-2010. The sample includes 7 different cohorts of NVs from various service industries followed for at least four years after their creation.

**Keywords**

Dynamic managerial capabilities; New ventures; Performance

**Acknowledgements**

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## 5. 1 Introduction

Organizational capabilities have received vast research attention over the last three decades due to their implications for the correct functioning of the firm (Eisenhardt and Martin, 2000; Nelson and Winter, 1982). In the capabilities literature, dynamic capabilities, those capabilities related to the intentional extension, creation, or modification of the firm's resource base, enabling evolutionary fitness through adaptation to and/or shaping of the external environment (Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece, and Winter, 2007), have gained notable relevance over organizational capabilities. The dynamic aspect contrast with the operational one by being concerned with change (Winter, 2003), a change that is needed in the current competitive dynamics of businesses where the adaptation to moving customer and technological opportunities is crucial (Teece, 2007).

Winter (2000) founded the concept of organizational capability on the broader concept of organizational routine, thus he define an organizational capability as a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type. Unlike ordinary capabilities, certain dynamic capabilities may be based on the skills and knowledge of one or a few executives rather than on organizational routines (Winter, 2012). This is the case of dynamic managerial capabilities (DMCs), those capabilities with which managers' build, integrate, and reconfigure organizational resources and competences (Adner and Helfat, 2003). The fact that certain dynamic capabilities may be grounded on the backgrounds of firm's executives rather than routines is very relevant in the context of NVs, given their short experience that is associated with low routinization of its activities (Helfat and Lieberman, 2002).

This paper aims to explore this topic, trying to understand firstly which are the key DMCs 'underpinnings in NVs' context and, secondly which are their influence on NVs' performance.

We address these questions waving three bodies of literature: research on DMCs (Adner and Helfat, 2003; Sirmon and Hitt, 2009; Beck and Wiersema, 2013; Kor and Mesko, 2013), NVs' top management teams (TMT), (Castanias and Helfat, 1991; Quigley and Hambrick, 2012) and the dynamic capabilities approach (Helfat,

Finkelstein, Mitchell, Peteraf, Singh, Teece, and Winter, 2007; Teece, 2012; Teece, 2007; Winter, 2003).

Three attributes of managers have been discussed as underpinning their DMCs, namely, (1) managerial human capital—the expertise and human capital required in decision-making; (2) managerial social capital—social relationship which provide influence, control, and power; and (3) managerial cognition—beliefs and mental models that serve as the basis for decision-making. And indeed, empirical research indicates that dimensions of DMCs affect performance, (Adner and Helfat, 2003; Townsend and Busenitz, 2014).

They constitute a "unique core" to the resource bundle of the firm, which then drives the creation, extension, and modification of the firm's resource portfolio, constituting the basis for why firms differ in their strategies and performance (Kor and Mesko, 2013; Townsend and Busenitz, 2014).

This line of research highlights the importance of DMCs as the key mechanism to achieve congruence between the firm's competencies and changing environmental conditions (Bergen and Peteraf, 2002; Adner and Helfat, 2003). They help to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance (Helfat and Martin, 2014).

New ventures (NVs) are those firms that are in their early stages of development and growth (Klotz, Hmieleski, Bradley, and Busenitz, 2014). Despite the importance of DMCs for NVs to achieve congruence between its competencies and changing environmental conditions, (Bergen and Peteraf, 2002; Adner and Helfat, 2003; Sirmon and Hitt, 2009), little is known about how DMCs' key attributes are developed in the first stage of a firm development and how they contribute to performance. Managerial human capital, managerial social capital and managerial cognition have special meaning in the case of NVs due to the lack of previous organizational experience, which imply lack of established routines, processes and systems to support organizational capabilities (Zahra, Sapienza, and Davidsson, 2006).

We will test our hypotheses on a longitudinal data set comprising a sample of 126 service NVs that entered the Alternative Investment Market (AIM) from the London Stock Exchange during the period 2004-2010. The sample includes 7 different cohorts of NVs from various service industries followed for at least four years.

## 5.2. Theory and hypotheses

DMCs are known as the capabilities with which managers create, extend, and modify the ways in which firms make a living. They help to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance (Helfat and Martin, 2014).

Adner and Helfat (2003), introduced the concept of DMCs drawing on a set of underlying managerial resources, namely, managerial human capital, managerial social capital and managerial cognition. These resources provide the basis for the patterned aspects of managerial intentionality, deliberation, decision making, and action (Martin, 2011).

Managerial human capital includes the skills and knowledge repertoire of managers, which are shaped by their education and personal and professional experiences (Becker, 1993; Castanias and Helfat, 2001). Managerial experiences in specific contexts (e.g., industry, company, geographical location) allow managers to acquire and develop specific knowledge and skills (Harris and Helfat, 1997; Kor, 2003).

In the case of NVs, past experiences that serve as likely sources for this knowledge and these skills will increase the probability that the required level of expertise in the requisite knowledge and skills will exist, and lead to higher levels of firm performance (Amason, Shrader, and Tompson, 2006; Beckman, 2006; Nelson, 2003). Knowledge gained through entrepreneurial experience shape the TMT's decisions and behaviours. Prior knowledge about markets, customer problems, and knowledge about how to serve markets will influence individuals' discovery of opportunities (Shane, 2000).

Furthermore, entrepreneur must often act as the central brain and agent: differentiation and specialization are not always possible. Consequently, the success of NVs is positively related to abroad set of skills and expertise exhibited by the entrepreneur. In the area of managerial human capital, educational level is strongly and positively correlated with company development even more than years of experience in the courseware industry (Van de Ven, Andrew H, Hudson, and Schroeder, 1984). In fact, TMT which holds high level of education take higher quality decisions. Certainly, relationships between level of education and performance are positive (Cooper, Folta, Gimeno-Gascon, and Woo, 1992).

*H1: TMTs' knowledge is related positively to the performance of NVs.*

By examining prior entrepreneurial experience, we focus on a type of experience that has been of considerable interest to study new firm performance. For instance NVs' survival (Delmar and Shane, 2004), NVs' growth (Colombo and Grilli, 2005), NVs' survival and sales (Delmar and Shane, 2006), strategic decision speed (Forbes, 2005) and number of opportunities identified (Gruber, MacMillan, and Thompson, 2012). As Teece (2012) emphasizes, entrepreneurial managers create markets and orchestrate resources. Thus, in an analysis of dynamic capabilities, Zahra, Sapienza, and Davidsson (2006) highlight the role of the entrepreneur in reconfiguring organizational resources and routines.

Entrepreneurial experience reflected as the number of previous ventures and the role played in such ventures was by far the most significant variable on the performance, considering that the large majority of previous ventures were successful (Stuart and Abetti, 1990). However, no impact was found over strategic decisions from previous start-up experience of the founder team (Schoonhoven, Eisenhardt, and Lyman, 1990).

*H2: Entrepreneurial capital is related positively to the performance of NVs.*

The managerial human capital framework provides a means to assess heterogeneity in managerial skills. Managers may differ in both the mix of their skills and in the level of ability for each type of skill (Adner and Helfat, 2003). Depending on the context, diversity may facilitate positive outcomes for the firm, or it may constrain them, or it may balance them. Some scholar identify in this issue a research opportunity. The investigation of contextual factors may help to understand the link between team diversity and performance (Johnson, Schnatterly, and Hill, 2013).

For instance, in dynamic industry environments, heterogeneous TMTs (heterogeneity prior experience: functional background, education level, educational specialty, and managerial skill) achieve greater firm performance when led by a directive leader, whereas homogenous TMTs do best when led by an empowering leader (Hmieleski and Ensley, 2007). In contrast, within stable industry environments, heterogeneous TMTs achieved greater firm performance when led by an empowering leader, whereas homogenous TMTs perform best when led by a directive leader.

Gruber, MacMillan and Thompson (2012) found a positive relationship between the heterogeneity of educational level of TMT and the number of opportunities identified. Other authors have found relationships between the number of opportunities identified and heterogeneity. For instance, Kor (2003) and Hambrick (1996) found heterogeneity of firm tenure in the TMT may influence a management team's approach to identifying and seizing new growth opportunities.

In this way, educational diversity of TMTs is positively related to the satisfaction of team members, but not to the perceived viability of teams by their members (Foo, Sin, and Yiong, 2006). Similarly, Amason et al. (2006) found no direct relationship between the heterogeneity of TMTs' prior experience (in terms of level of education, specialization of education, and functional background) and firm performance.

Although gender diversity on management teams is limited, studies about team compositions show that in recent years it has increased particularly at small and mid-sized companies. Low levels of heterogeneity (i.e. all male directors) can significantly reduce social integration (Williams and O'Reilly, 1998) and can impact negatively on the firm performance (Westphal and Bednar, 2005)

*H3: Heterogeneity is related positively to the performance of NVs.*

Earlier social capital researcher argued the association between social capital and firms' value creation (Nahapiet and Ghoshal, 1997; Tsai and Ghoshal, 1998). The concept of social capital reflects the idea that social ties (e.g., friendships, social club memberships), and the goodwill that these ties may confer, transfer to other settings such as work. Social ties also may help to transfer information from one setting to another (Adner and Helfat, 2003). The concept of managerial social capital was introduced as the managers' ability to access resources through relationships and connections, (Adler and Kwon, 2002). This definition distinguishes between external social capital and internal social capital that derive from ties outside of and within an organization, respectively.

External social capital leads to access to external resources and providing information about practices in different firms. Both of them can improve firm performance (Geletkanycz and Hambrick, 1997). Strategy research on the social capital of managers has tended to focus on external ties, often in the form of directorships of

other companies (Adner and Helfat, 2003). In the context of DMCs, social ties outside of the organization can provide access to resources, such as financing and skilled personnel, needed for investments to seize opportunities (Pfeffer and Salancik, 2003).

In addition to external ties, managers generally possess internal social capital. Advantageous positions in an internal social network, such as a position of centrality, also may confer power over resources that are useful in seizing opportunities (Helfat and Martin, 2014). Corporate managers depend upon information from division managers in order to make decisions. Business-level managers depend on corporate and sometimes other business-level managers for resources and information (Burt, 1997). Sources of internal social capital are those past experiences that have been shared with others (Beck and Wiersema, 2013).

To the extent that managers differ in their network ties, both internal and external to the corporation, they will have different social capital and access to information. Differences in information sources thus may lead managers to make different decisions (Adner and Helfat, 2003).

In the case of NVs the managerial social capital is even more critical to their performance than their initial teamwork capabilities. Network linkages to key resources partners drive to higher performance (Brinckmann and Hoegl, 2011). TMTs with extensive social networks tend to achieve superior performance, and such effects complement, rather than replace, advantages gained by having a diverse or heterogeneous founding team (Vissa and Chacar, 2009).

Research interest in managerial social capital is growing, within the NVs literature due to in the first stage of NVs, deep connections with close friends, family members or former managers who possess business-related knowledge are key (Klotz, Hmieleski, Bradley, and Busenitz, 2014). During this stage, having deep personal relationships with trusted individuals who can be called on for business advice, financial resources, and critical labor needs can make an important difference in being able to overcome the difficulties in the first stage of NVs (Zolin, Kuckertz, and Kautonen, 2011).

Outside networks play an important role in the identification of entrepreneurial opportunities and the development of such opportunities into viable businesses. Having a broad range of business-related connections is particularly important, because such

relationships provide a wide range of information inputs that, when creatively combined, form the raw material for developing entrepreneurial opportunities (Baron and Tang, 2009; Baron, 2006; Ozgen and Baron, 2007).

*H4: Internal social capital is related positively to the performance of NVs.*

*H5: External social capital is related positively to the performance of NVs.*

Managerial cognition refers to managerial beliefs and mental models that serve as a basis for decision making (Prahalad and Bettis, 1986). Managerial cognition is shaped by personal and professional experiences and managers' interactions in internal and external networks. Due to bounded rationality, managers may not have full information about future events, alternatives, and consequences (Adner and Helfat, 2003). Managerial cognition involves schemas and mental models that include a system of theories and propositions (Huff, 1990) that managers use to see their way through a bewildering flow of information to make decisions (Walsh, 1995).

Helfat and Peteraf (2013), introduced the concept of managerial cognitive capability which refers to the capacity of individual managers to perform mental activities. They identified specific types of cognitive capabilities that underpin dynamic managerial capabilities for sensing (attention and perception), seizing (problem solving and reasoning), and reconfiguring (language and communication as well as social cognition), and explained their potential impact on strategic change of organizations.

Entrepreneurship researchers have made significant inroads in the study of shared cognition among TMT's members (Klotz, Hmieleski, Bradley, and Busenitz, 2014). For instance, West (2007) advanced a model of TMT collective cognition and discovered an inverted U-shaped relationship between collective cognition (differentiation and integration) and NVs' performance such that firms led by TMTs with very high or low collective cognition experienced lower levels of performance than those led by TMTs with moderate levels of collective cognitions. Chowdhury (2005), examined the relationship between cognitive comprehensiveness (how effectively TMTs developed a complete set of possible solutions to problems) and team effectiveness and concluded it is positive even when controlling for demographic diversity of team members.

Research has often used demographic diversity of TMTs as a proxy for cognitive diversity, and has produced mixed results regarding the impact of such diversity on

organizational performance (Finkelstein, Hambrick, and Cannella, 2009). Others used secondary sources of information as letters to shareholders from company annual report to estimate mental models of TMT (Kaplan, Murray, and Henderson, 2003; Nadkarni and Narayanan, 2007). Prior shared experience and background characteristic of managers have served as an observable proxy for unobservable cognitive - mental models (Townsend and Busenitz, 2014). Organizational capabilities may be affected by the pre-existing mental representations of TMT (Laamanen and Wallin, 2009).

Shared prior experience of TMT, overlap in human capital and social capital is quite common. NVs are often founded by teams of friends, family members, and work colleagues who share similar backgrounds and experiences (Reynolds, Bygrave, Autio, Cox, and Hay, 2002). Shared prior experience can enable TMTs to make quick and unified strategic decisions, which can be advantageous for the effective performance in turbulent industry environments (Baum and Wally, 2003; Eisenhardt and Schoonhoven, 1990; Kor, 2003).

In the case of NVs, due to the lack of previous experience not all the DMCs' attributes have the same impact on their performance. Established routines and procedures are replaced by prior experience of founders and TMT. Thus, common cognitive mental models and working cohesion of the team could determine a higher performance.

Many researchers include prior shared work experience in their studies as a proxy of the shared mental model and cohesion of the team e.g.(Harris and Helfat, 1997; Carroll and Harrison, 1998; Kor, 2003; Barkema and Shvyrkov, 2007). More recently, Zheng (2012) argues that the observed prior shared experience effect may actually reflect an underlying team cognitive process. His results show that prior shared experience enables founding teams to effectively and efficiently integrate their members' expertise and skills.

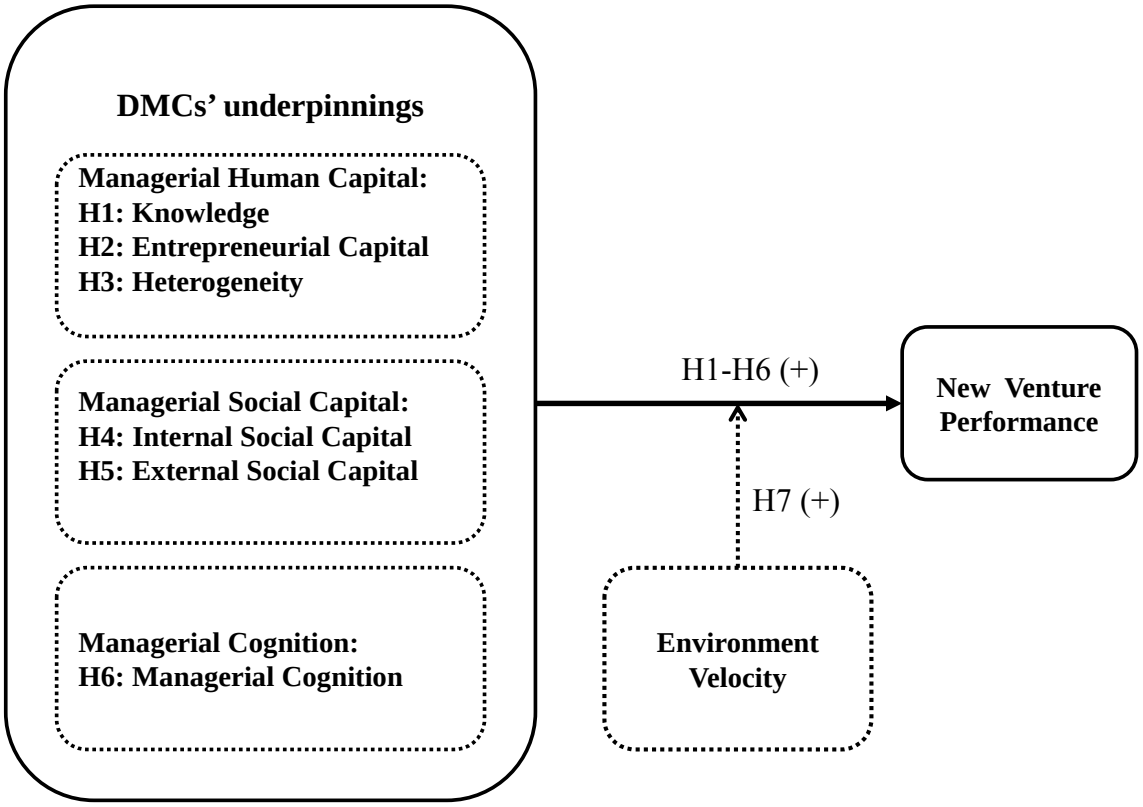
*H6: Managerial cognition is related positively to the performance of NVs.*

Although environmental dynamism is multidimensional (i.e., velocity, complexity, ambiguity, and unpredictability), and has unique effects on performance (Davis, Eisenhardt, and Bingham, 2009). Some research focuses on specific environmental features such as ambiguity (March and Olsen, 1976). Other research mixes several dimensions together, such as ambiguity and complexity, to describe

environmental dynamism in an industry (Pisano, 1994). Still other research uses a single term such as velocity but then actually combines multiple dimensions such as unpredictability, ambiguity, and velocity because of these dimensions are often correlated in many actual environments (Eisenhardt, 1989). The Eisenhardt's research (1989), focused on making fast strategic decisions in high-velocity environments. Among other conclusions, she argued the velocity of the environment impact on the quality and speed TMT made strategic decisions. Based on the last definition of DMCs from Helfat and Martin (2015): *"Dynamic managerial capabilities are the capabilities with which managers create, extend, and modify the ways in which firms make a living and help to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance"*, we build hypothesis 7.

*H7: The impact of DMCs' underpinnings on new venture performance is partially mediated by the velocity of the environment.*

**Figure 5.1. Conceptual framework**



## 5.3. Data and methods

### 5.3.1 Sample

The empirical context of this paper is provided by NVs listed to AIM. It supplies us a setting of fast growing young firms which need financial resources to keep growing. The sample includes 126 multi-sector service NVs registered from 2004 to 2010. These companies entered AIM in the 2 first years of activity. The changes and challenges that accompany the creations of a firm and doing public in the first 2 years of activity imply an opportunity for discover how TMT compositions influence on strategic decisions and thus in the growth and survival of NVs. We consider 7 cohorts of firms born in: 2004 (42), 2005 (29), 2006 (28), 2007 (9), 2008 (4), 2009 (6) and 2010(8). All of them are analyzed from their date of register to 2013.

The final sample includes a total of 1.029 observations from 126 firms. The longitudinal data of management profiles are gathered from annual reports of AIM and completed by Amadeus and professional social networks. Data on firm performance and firm size are compiled from Amadeus. As a general rule, we consider all inside executives listed in the board section of the annual reports.

### 5.3.2 Variables

Following the example of the seminal paper written by Adner and Helfat (2003), we use return on assets as a dependent variable. Annual return on assets (ROA) gives an idea as to how efficient management is at using its assets to generate earnings.

The control variables are used at different levels:

External environmental: different environmental dynamism dimensions have unique effects on performance (Davis, Eisenhardt, and Bingham, 2009). Velocity, the speed or rate at which new opportunities emerge, is included as an indicator of environmental dynamism (Eisenhardt, 1989). We measured the velocity of the environment as the annual number of new ventures by NACE code. Munificence, the abundance of resources, is a key contingence variable (Starbuck, 1973). Not all environments have the same level of resources or munificence. This fact has an influence on strategic decisions and the performance of the firms (Castrogiovanni, 1991). For instance, less munificent environments support the use of complex, external social relationships by organizations (Hirsch, 1975). Munificence is calculated as a sales

growth rate that represents the percentage change in industry sales from the previous year.

Firm level: in spite of them all being new service firms, their origins are diverse. We consider origin as a dichotomy variable where 1 is if the company is completely independent (independent NV), and 0 is if the company is supported by a corporation (corporate NV). We implement a control for the size of the firm because research suggests that size can affect performance outcomes (Zajac, Kraatz, and Bresser, 2000). The size of the firm is calculated as the growth rate of the number of employees.

Board level: duality is a dichotomy variable where 1 is when the CEO serves as board chairperson (Rechner and Dalton, 1991). The size of the board is the number of members on the board (executives and non-executives). The competence of a TMT can be affected by its size (Kor, 2003).

TMT level: the mean age of TMT. We use age as a control variable because it can be correlated with cognitive abilities (Hambrick and Mason, 1984). A TMT's competence could also be linked to the number of managers serving in the team, and thus team size is included as a control variable (Kor, 2003).

As the main effects of the model, we use DMCs' underpinnings from the factor analysis specified in Chapter 4: managerial human capital (knowledge, entrepreneurial capital, and heterogeneity), managerial social capital (internal and external social capital), and managerial cognition.

### 5.3.3 Methodology

We run a regression data panel to identify the main effects of DMCs' underpinnings on performance for the first 10 years of NVs. Using factor scores as regressors is quite common in disciplines such as psychology or marketing (e.g. Lastovicka and Thamodaran, 1991; Skilling, Harris, Rice, and Quinsey, 2002). The panel is unbalanced due to there being different cohorts of firms. Cohort 2004 has 10 periods (2004-2013); cohort 2005 has nine periods (2005-2013), and so forth. We use as independent variables DMCs' underpinnings from the factor analysis. As control variables we use velocity, munificence, size of the firm, origin, duality, size of the board, size of TMT, and age of TMT. ROA is used as a dependent variable.

We confirm the nonexistence of endogeneous variables in the models by testing $cov(x_{it}, \varepsilon_t)=0 \ \forall \ x_{it}$. Furthermore, we confirm the nonexistence of predetermined variables in the models by testing $cov(x_{it}, \varepsilon_{t+1, t+2})=0 \ \forall \ x_{it}$. However, through the definition of the dependent variable ROA, our model is endogeneous in itself, because $cov(ROA_t, ROE_{t+1})\neq 0$. Thus, we run the *xtabond2* (Roodman, 2006) command for dynamic data panel models. The results are shown in Table 5.1. (descriptive statistics) and Table 5.2. (regression).

## 5.4. Results

Table 5.2. presents the coefficient estimates for the effects of DMCs' underpinnings on ROA (return on assets). As the base model, the first model has all the control variables. The second model includes both control and main variables. Interaction variables (velocity x main effects) enter the regressions one at a time from the third to the eighth model. The ninth model is the full model, with the control, the main, and all the interaction variables. Table 5.3. shows data for the identification of the models. Five conditions could be verified. Firstly, The number of groups must be greater than the number of instruments, this condition being verified by all the models. Secondly, the Wald test must be statistically significant, this condition being verified by all the models; all p-values = 0,000. Thirdly, models must not present second order autocorrelation, all models having AR(2) p-values that are greater than 0,05. Fourthly, the Hansen test for over-identification must be accepted. The null hypothesis is that the model is identified. Moreover, the p-value must be more than 0,1 and less than 0,8. This condition is verified by all the models. Finally, the instruments must be exogenous in both the GMM and the IV estimations. Only Model 1 has lower levels in the Hansen exogeneity tests. However, we recognize that the quality of the model is improving as we approach the full model.

**Table 5.1. Means, standard deviations, and correlations**

| | MEAN | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. ROA | -35,12 | 122,45 | 1 | | | | | | | | | | | | | | |
| 2. Velocity | 10.369,09 | 10.892,78 | -0,04 | 1 | | | | | | | | | | | | | |
| 3. Munificence | 4,18 | 88,35 | 0,01 | -0,02 | 1 | | | | | | | | | | | | |
| 4. Size (firm) | 0,23 | 0,82 | 0,07 | 0,08 | 0,00 | 1 | | | | | | | | | | | |
| 5. Origin (firm) | 0,30 | 0,46 | -0,05 | 0,23* | 0,02 | 0,09* | 1 | | | | | | | | | | |
| 6. Duality | 0,14 | 0,35 | 0,02 | 0,10* | -0,02 | -0,04 | -0,09* | 1 | | | | | | | | | |
| 7. Size (board) | 5,77 | 2,01 | 0,11* | -0,13* | 0,00 | 0,02 | -0,09* | -0,21* | 1 | | | | | | | | |
| 8. Size (TMT) | 2,88 | 1,31 | 0,08 | 0,02 | -0,01 | 0,00 | -0,09* | -0,03 | 0,69* | 1 | | | | | | | |
| 9. Age (TMT) | 48,88 | 6,36 | -0,07 | 0,00 | -0,02 | -0,03 | -0,01 | 0,08* | 0,08 | 0,12* | 1 | | | | | | |
| 10. Knowledge | 0,00 | 1,00 | 0,00 | -0,09* | 0,01 | 0,02 | 0,04 | -0,05 | 0,13* | 0,01 | 0,06 | 1 | | | | | |
| 11. Entrepreneurial capital | 0,00 | 1,00 | 0,00 | -0,06 | -0,02 | 0,07 | 0,31* | -0,05 | -0,14* | -0,10* | -0,08 | 0,01 | 1 | | | | |
| 12. Heterogeneity | 0,00 | 1,00 | 0,04 | 0,08 | 0,00 | 0,04 | -0,13* | -0,05 | 0,34* | 0,49* | -0,01 | 0,01 | 0,02 | 1 | | | |
| 13. Internal social capital | 0,00 | 1,00 | 0,00 | -0,05 | -0,01 | -0,20* | -0,07 | 0,02 | 0,03 | 0,01 | 0,31* | -0,01 | -0,02 | -0,01 | 1 | | |
| 14. External social capital | 0,00 | 1,00 | 0,09* | 0,01 | -0,04 | 0,01 | -0,02 | 0,01 | 0,19* | 0,24* | 0,08 | -0,01 | 0,01 | -0,02 | -0,01 | 1 | |
| 15. Managerial cognition | 0,00 | 1,00 | 0,05 | -0,09* | -0,01 | 0,01 | -0,01 | -0,04 | 0,12* | 0,21* | -0,06 | 0,02 | -0,02 | 0,00 | -0,01 | -0,05 | 1 |

Note: n = 1.029 (* p<0,01).

**Table 5.2. Results of difference GMM dynamic panel regression**

| Dynamic panel-data estimation, two-step system GMM | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | | **Model 5** | | **Model 6** | | **Model 7** | | **Model 8** | | **Model 9** | |
| | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** | **COEF** | **SE** |
| ROA_L1 | 0,19*** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 | 0,19** | 0,06 |
| Velocity | -0,02 | 0,05 | 0,01 | 0,04 | 0,02 | 0,04 | 0,01 | 0,04 | -0,01 | 0,04 | 0,02 | 0,04 | 0,01 | 0,04 | 0,00 | 0,04 | -0,02 | 0,04 |
| Munificence | 0,00 | 0,00 | 0,01 | 0,00 | 0,01+ | 0,00 | 0,01 | 0,00 | 0,01+ | 0,00 | 0,01 | 0,00 | 0,01 | 0,00 | 0,01 | 0,00 | 0,01+ | 0,00 |
| Size (firm) | 0,06* | 0,03 | 0,05+ | 0,03 | 0,06+ | 0,03 | 0,05+ | 0,03 | 0,05** | 0,02 | 0,05+ | 0,03 | 0,05+ | 0,03 | 0,05+ | 0,03 | 0,05** | 0,02 |
| Origin (firm) | -0,06 | 0,09 | -0,08 | 0,11 | -0,09 | 0,11 | -0,09 | 0,11 | -0,08 | 0,10 | -0,08 | 0,11 | -0,09 | 0,12 | -0,09 | 0,12 | -0,11 | 0,11 |
| Duality | 0,16 | 0,14 | 0,25* | 0,11 | 0,24* | 0,10 | 0,27* | 0,11 | 0,27* | 0,11 | 0,26* | 0,11 | 0,24* | 0,11 | 0,25* | 0,11 | 0,29** | 0,11 |
| Size (board) | 0,13 | 0,08 | 0,12 | 0,08 | 0,12 | 0,09 | 0,12 | 0,08 | 0,11 | 0,08 | 0,12 | 0,08 | 0,12 | 0,08 | 0,12 | 0,08 | 0,12 | 0,08 |
| Size (TMT) | -0,02 | 0,05 | -0,08 | 0,06 | -0,07 | 0,06 | -0,08 | 0,06 | -0,07 | 0,06 | -0,08 | 0,06 | -0,09 | 0,06 | -0,08 | 0,06 | -0,07 | 0,06 |
| Age (TMT) | -0,07* | 0,03 | -0,09* | 0,04 | -0,08* | 0,04 | -0,08* | 0,04 | -0,08* | 0,04 | -0,09* | 0,04 | -0,09* | 0,04 | -0,09* | 0,04 | -0,08* | 0,04 |
| Knowledge | | | 0,01 | 0,03 | 0,01 | 0,03 | 0,02 | 0,03 | 0,00 | 0,03 | 0,01 | 0,03 | 0,01 | 0,03 | 0,01 | 0,03 | -0,01 | 0,03 |
| Entrepreneurial capital | | | 0,01 | 0,04 | 0,02 | 0,04 | 0,02 | 0,04 | 0,00 | 0,04 | 0,02 | 0,04 | 0,02 | 0,04 | 0,01 | 0,04 | 0,01 | 0,04 |
| Heterogeneity | | | 0,03 | 0,03 | 0,03 | 0,04 | 0,03 | 0,03 | 0,03 | 0,03 | 0,03 | 0,03 | 0,04 | 0,03 | 0,03 | 0,03 | 0,04 | 0,03 |
| Internal social capital | | | 0,04+ | 0,02 | 0,04 | 0,03 | 0,04 | 0,02 | 0,03 | 0,03 | 0,04 | 0,03 | 0,04+ | 0,03 | 0,04+ | 0,02 | 0,03 | 0,03 |
| External social capital | | | 0,05** | 0,02 | 0,05** | 0,02 | 0,05** | 0,02 | 0,05** | 0,02 | 0,05** | 0,02 | 0,05** | 0,02 | 0,05** | 0,02 | 0,06*** | 0,02 |
| Managerial cognition | | | 0,04* | 0,01 | 0,03* | 0,02 | 0,04* | 0,02 | 0,03* | 0,02 | 0,04* | 0,01 | 0,03* | 0,01 | 0,03* | 0,01 | 0,03 | 0,02 |
| Velocity x Knowledge | | | | | -0,01 | 0,03 | | | | | | | | | | | -0,01 | 0,04 |
| Velocity x Entreprenenurial capital | | | | | | | 0,03 | 0,03 | | | | | | | | | 0,01 | 0,03 |
| Velocity x Heterogeneity | | | | | | | | | 0,06* | 0,02 | | | | | | | 0,08** | 0,03 |
| Velocity x Internal social capital | | | | | | | | | | | -0,03 | 0,04 | | | | | -0,03 | 0,04 |
| Velocity x External social capital | | | | | | | | | | | | | 0,03 | 0,03 | | | 0,04 | 0,03 |
| Velocity x Managerial cognition | | | | | | | | | | | | | | | -0,04 | 0,03 | -0,04 | 0,04 |

(+) p<0,10; (*) p<0,05; (**) p<0,01; (***) p<0,001. Variables have been standardized.

**Table 5.3. Identification of the models and quality of the instruments**

| Dynamic panel-data estimation, two-step system GMM | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** | **Model 6** | **Model 7** | **Model 8** | **Model 9** |
| GROUPS | 121 | 119 | 119 | 119 | 119 | 119 | 119 | 119 | 119 |
| INSTRUMENTS | 52 | 58 | 59 | 59 | 59 | 59 | 59 | 59 | 64 |
| WALD | 41,39*** (p=0,000) | 216,80*** (p=0,000) | 221,71*** (p=0,000) | 181,69*** (p=0,000) | 181,69*** (p=0,000) | 184,26*** (p=0,000) | 289,60*** (p=0,000) | 225,42*** (p=0,000) | 282,57*** (p=0,000) |
| AR(1) | -2,00* (p=0,046) | -1,97* (p=0,049) | -1,97* (p=0,049) | -1,97* (p=0,049) | -1,96* (p=0,049) | -1,97* (p=0,049) | -1,97* (p=0,049) | -1,97* (p=0,049) | -1,97* (p=0,049) |
| AR(2) | -0,10 (p=0,924) | -0,24 (p=0,812) | -0,23 (p=0,820) | -0,24 (p=0,809) | -0,25 (p=0,801) | -0,24 (p=0,812) | -0,25 (p=0,804) | -0,24 (p=0,812) | -0,26 (p=0,795) |
| HANSEN TEST OF OVERIDE (H0: the model is identified) | 50,76 (p=0,194) | 51,17 (p=0,184) | 52,39 (p=0,154) | 52,29 (p=0,157) | 47,98 (p=0,278) | 50,28 (p=0,207) | 50,80 (p=0,193) | 51,43 (p=0,177) | 46,16 (p=0,343) |
| HANSEN EXOGENEITY TEST GMM ((L.ROA lag (2.)) (H0: the instruments are exogenous) | 14,02 (p=0,081) | 6,90 (p=0,547) | 6,92 (p=0,545) | 6,58 (p=0,583) | 5,46 (p=0,708) | 7,05 (p=0,531) | 7,26 (p=0,509) | 6,66 (p=0,573) | 4,92 (p=0,766) |
| HANSEN EXOGENEITY TEST IV (H0: the instruments are exogenous) | 15,17 (p=0,056) | 20,65 (p=0,111) | 21,77 (p=0,114) | 22,35 (p=0,099) | 18,09 (p=0,258) | 21,27 (p=0,128) | 20,62 (p=0,150) | 21,87 (p=0,111) | 22,27 (p=0,326) |

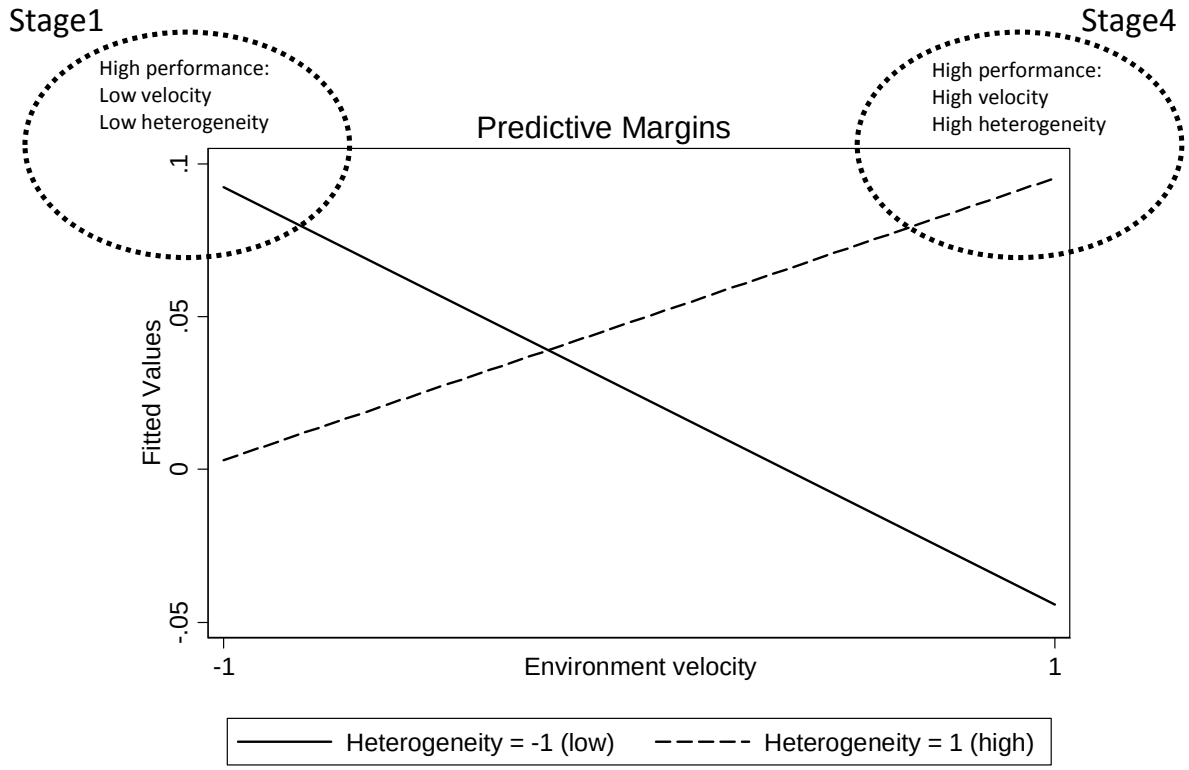
We argue from Hypothesis 1 to 6, that DMCs' underpinnings are positively related to the performance of NVs. Hypothesis 1 suggests a positive relationship between knowledge and performance. There was no support for this hypothesis for either model. The same is true for Hypothesis 2, which suggests a positive relationship between entrepreneurial capital and performance. The third hypothesis suggests a positive relationship between heterogeneity and performance. In spite of fact that the direct effect of heterogeneity on performance does not exist, the interaction of environment velocity and heterogeneity becomes significant in Models 5 and 9. Models 2 and 7 support Hypothesis 4. H4 suggests a positive relationship between internal social capital and performance. The results support Hypothesis 5 in all the models. Thus, we can affirm that there is a positive relationship between external social capital and performance. Hypothesis 6 is supported by all the models apart from the full model (9).

In support of Hypothesis 7, empirical evidence indicates that the performance of NVs increases when the velocity of the environment and the heterogeneity of the TMT are low (Table 5.4. - Stage 1) or high (Table 5.4 - Stage 4).

**Table 5.4. Predictive margins velocity x heterogeneity interaction**

| **Predictive margins** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Model VCE: Corrected** | | | | | | | |
| **Number of observations: 726** | | | | | | | |
| **Expression: Fitted values, predict ()** | | | **Margin** | **SE** | ***P>z*** | **[95% Conf. interval]** | |
| **Stage 1** | **Velocity: -1** | **Low** | **0,09** | **0,05** | **0,08**$^{+}$ | **-0,01** | **0,19** |
| | **Heterogeneity: -1** | **Low** | | | | | |
| Stage 2 | Velocity: -1 | Low | 0,00 | 0,08 | 0,97 | -0,15 | 0,15 |
| | Heterogeneity: 1 | High | | | | | |
| Stage 3 | Velocity: 1 | High | -0,04 | 0,07 | 0,54 | -0,18 | 0,10 |
| | Heterogeneity: -1 | Low | | | | | |
| **Stage 4** | **Velocity: 1** | **High** | **0,10** | **0,04** | **0,02**$^{*}$ | **0,02** | **0,17** |
| | **Heterogeneity: 1** | **High** | | | | | |

**Figure 5.2. Predictive margins of environment velocity and TMT's heterogeneity**




Finally, some control variables were statistically significant: environment munificence (+), size firm (+), duality (+), and age of TMT (-).

## 5.5 Discussion and expected contributions

This paper develops and tests the configuration of DMCs' underpinnings and their effects on the NVs' performance.

The results of the factor analysis (Table 4.3.) highlight how the variance explained by the model is distributed: 20% come from F1: Internal social capital, 18% come from F2: Managerial cognition, 16% come from external social capital, 14% come from heterogeneity, 13% come from entrepreneurial capital, and 10% come from knowledge. The premise of experience as the foundation of DMCs is proved in this thesis: breadth of experience as part of internal social capital, prior shared experience as part of managerial cognition, background of experience as part of heterogeneity, depth of experience as part of external social capital, and experience as founder as part of entrepreneurial capital.

Previous research about DMCs (Helfat and Martin, 2014; Sirmon and Hitt, 2009; Townsend and Busenitz, 2014) explains their meanings and their influence on strategic change, even though DMCs also mediate among other effects. However, do not exist a measurement themselves. We contrast the effect of each component on performance during the first 10 years of activity.

Through this measurement, we discover that all the attributes do not have the same importance in the first stage of NVs. Internal social capital, external social capital, and managerial cognition are supported by almost all the models, and, the relationship is positive. This means that NVs with cohesive teams, links in other companies and higher prior shared experience have higher performance during their first 10 years of activity. Components such as internal and external social capital, and managerial cognition stand out from the rest. The explanation may be based on the lack of routines and procedures in NVs. In the initial stages, the heritage of both the founders and the TMT provides the necessary tools to begin the journey. However, once the NVs has embarked on this journey, is this new TMT which has to work together in order to make progress.

Environments with abundant resources enable the companies to improve their performance. Environmental variables have a positive impact (munificence) and velocity when they interact with a TMT's heterogeneity. The article written by Eisenhardt (1989) answers the question of how executive teams make rapid decisions in high-velocity environments, although less is known about the composition of these teams. In this work, we conclude that the performance of the firm is better if the velocity of the environment is high and the TMT is heterogeneous, or if the velocity of the environment is low and the TMT is homogenous. Certainly, diverse teams have the capacity to adapt quickly to environmental changes (Boeker and Wiltbank, 2005).

Not only the size of the firms has influence on performance, larger companies have higher performance but also the age of the TMT. Younger teams are likely to be associated with a greater level of strategic change and higher performance, according to previous researchers (Grimm and Smith, 1991; Thomas, Litschert, and Ramaswamy, 1991). Our results point in the same direction; all the models support the negative relationship between a TMT's age and performance.

Not all the DMCs have the same effect on performance. Neither knowledge nor entrepreneurial capital are significant in our models. One explanation may be the nature of our sample. All the companies in our sample are fast-growing new ventures that

compete in a high intensive knowledge environment. Usually, these firms have high quality and entrepreneurial teams. Previous researchers have found no impact of level of knowledge or entrepreneurial experience on innovative environments (Schoonhoven, Eisenhardt, and Lyman, 1990; Almus and Nerlinger, 1999).

As we mentioned above, heterogeneity has a positive impact on performance mediated by the velocity of the environment. Homogeneous teams operate more effectively in low-velocity environments, and diverse teams do so in high-velocity ones.

Social capital has a strong influence on performance. Hypotheses 4 and 5 have been supported by almost all the models, which means that internal ties and cohesive teams improve the performance of firms. Moreover, external links lead to obtaining resources that may be key in the first stage of NVs.

Finally, we confirm the positive relationship between managerial cognition and NVs' performance. Certainly, prior shared experience among executives is a key entrepreneurial resource for NVs.

We believe that our study makes several contributions to the strategy and entrepreneurship literatures. First, we signal the importance of dynamic capabilities at the level of the TMT rather than at the level of the organization during the early years of an NV's activity. Therefore, we try to direct research attention towards DMCs rather than towards dynamic capabilities in the context of NVs. Second, we show how distinct from current theorizing DMCs are in the case of NVs.

We prove that the contributions of the different attributes of DMCs to NV performance change over time. These results highlight the relevance of dynamic managerial processes to the success of NVs. The study also has important implications for NVs' managers. Indeed, understanding the connection between the different components of their DMCs and the performance of their ventures over time is crucial for their strategic decisions.

# CHAPTER 6: Conclusions

## 6.1 Introduction

The major challenges new ventures (NVs) face in their pursuit of growth and survival is the point of departure of this dissertation. During the firm early stages, the capabilities of the founding team are at the forefront of the success of new ventures (Chahine, Filatotchev, and Zahra, 2011), as the routines and systems that lay the ground for the effective development of ordinary and dynamic organizational capabilities (Winter, 2000) are unlikely to be fully developed (Helfat and Lieberman, 2002).

In particular, recent research has drawn attention to the role of managers, individually and in teams, in explaining heterogeneity in firm performance under conditions of change (Helfat and Martin, 2015). This stream of research extends the dynamic capabilities perspective (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997) focusing on what are referred to as dynamic managerial capabilities (DMCs); the capabilities with which managers create, extend, and modify the ways in which firms make a living. They draw on a set of underlying managerial resources, namely, managerial human capital, managerial social capital and managerial cognition, which provide the basis for the patterned aspects of managerial intentionality, deliberation, decision making, and action (Martin, 2011). DMCs constitute a "unique core" to the resource bundle of the firm, which then drives the creation, extension, and modification of the firm's resource portfolio, constituting the basis for why firms differ in their strategies and performance (Kor and Mesko, 2013; Townsend and Busenitz, 2014).

Since the introduction of the concept of DMCs in the strategic literature almost 15 years ago, many authors have analyzed their influence on performance. However, the existing research on DMCs in the context of NVs is limited, and to our knowledge no study offers a framework for their empirical measurement.

In order to fill this research gap, we departed by conducting a literature review to establish the current state of the art of the concept of DMCs. We searched for the term "Dynamic Managerial Capabilities" in the abstract of academic articles from top journals (those with a JCR index), finding 11 papers where DMCs are mentioned in an explicit or implicit way. Only one of them (Townsend and Busenitz, 2014) measured DMCs cross-sectionally in the context of NVs through a pre-established questionnaire.

Based on the revision we reflected on the evolution of the concept of DMCs and how their key components have been measured, and proposed a set of variables with which to measure each DMC's underpinnings--managerial human capital, managerial social capital and managerial cognition--, all of this in the context of NVs.

Young companies that enter alternative markets in their first years of activity provide a good framework for testing the potential development of DMCs as their top management teams are seeking to achieve rapid growth for their companies. For this reason, we studied the population of new ventures operating in service industries that entered the Alternative Investment Market of the London Stock Exchange (AIM) in their first two years of activity for the period between 2004 and 2010. Through the analysis of annual reports, Amadeus and professional social networks, we built a longitudinal database containing details of the professional background of all the members of the top management teams of a total of 126 new ventures that matched our search criteria. These teams were tracked from the date of their register up to 2013. Each company was followed for at least four years. Our study provides a framework for measuring DMCs' dimensions in combination. Our results confirm, in agreement with previous theoretical studies, that prior professional experience drives all three DMCs' underpinnings. Specifically, the *background of experience* drives the entrepreneurial capital and heterogeneity components of managerial human capital, *breadth and depth of experience* foster managerial social capital, and *prior shared experience* accounts for managerial cognition.

Our results also suggest that not all DMCs' underpinnings have the same impact on performance during the early stages of NVs' development. Through a panel data analysis, we discover that managerial social capital (internal and external) and managerial cognition stand out against managerial human capital in their performance implications. We believe that previous and current relationships improve the ties among top management teams' members and encourage the cohesion of the team. Alternatively, knowledge and entrepreneurial capital (as factors reflecting managerial human capital) might not have a clear effect on performance in our study due to the empirical setting of the sample. These kinds of variables may be of no significance in high intensity knowledge environments (Schoonhoven, Eisenhardt, and Lyman, 1990; Almus and Nerlinger, 1999).

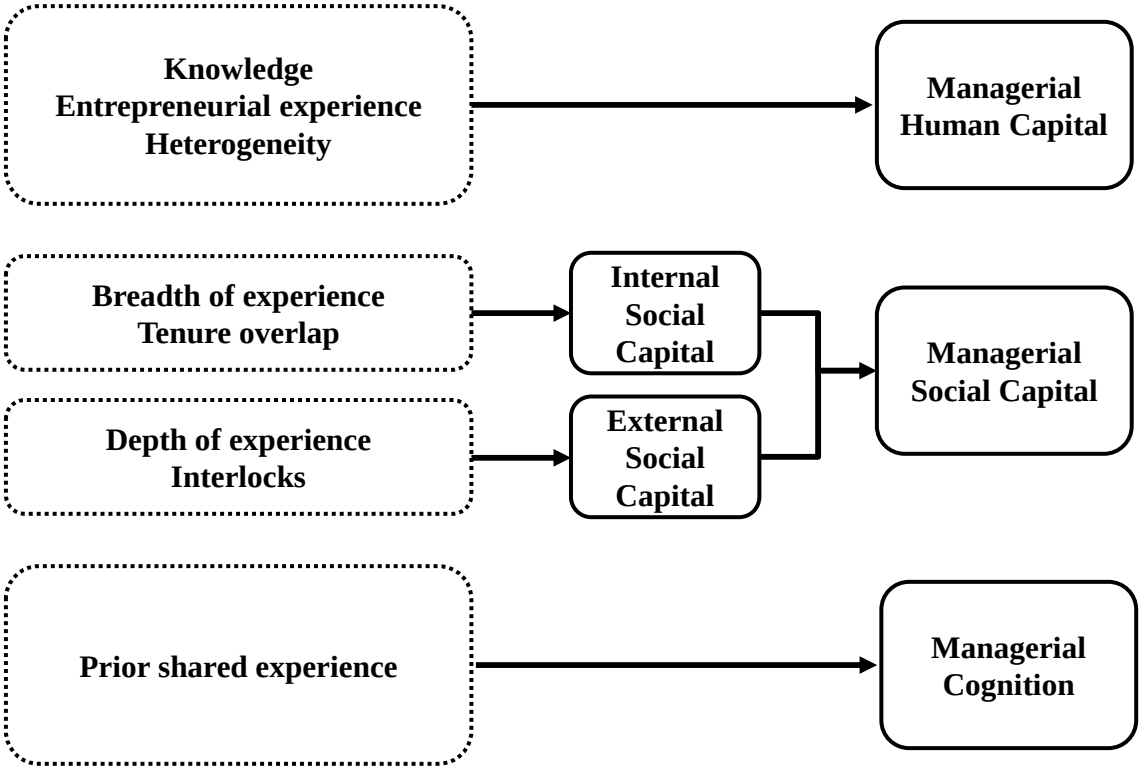
Finally, the degree of environmental change is proved to have a contingent effect on the role played by the three DMC dimensions on NV performance. We assess environmental change through environmental velocity, which refers to the speed at which opportunities and threats emerge in the environment (Davis, Eisenhardt and Bingham, 2009), and find that managerial social capital (internal and external) and managerial cognition are positively related to the performance of NVs during the early stages of their development, regardless of the level of environmental velocity. However, the heterogeneity of managerial human capital has a different value for NVs depending on the degree of environmental velocity. Homogeneous teams provide advantages under conditions of low environmental velocity, whereas heterogeneous teams pay off in high velocity contexts.

## 6.2 Implications for theory

Since Adner and Helfat's (2003) seminal paper, in which the concept of Dynamic Managerial Capabilities was introduced, there is agreement on its definition and multidimensionality and in the fact that they are relevant for achieving environmental fit under conditions of change. However, several issues remain unexplored. This dissertation fills in some of those existing research gaps.

The first research gap that this dissertation fills is to offer a broad understanding of how DMCs are configured in the early stages of NVs providing a framework for its measurement. As result of factor analysis in our longitudinal data set, we provide an understanding of the composition of DMCs' underpinnings. Figure 6.1. shows the variables that shape each DMC's underpinning.

**Figure 6.1. Variables of DMCs' underpinnings**




In line with previous research, we prove that experience is the basis of all the components of DMCs (Helfat and Martin, 2015); yet, we offer a fine grained distinction of which types of particular experience shape each DMC' underpinning. In the case of managerial human capital, we identify entrepreneurial experience and background of experience as building elements. In the case of managerial social capital, the key drivers are breadth of experience (internal) and depth of experience (external). Finally, prior shared experience (among top management team members prior to the launch of the venture) is the main element of managerial cognition.

Through the scores (mean = 0 and SD = 1) of the factor analysis, we can observe the trend of DMCs' underpinnings during the companies' first 10 years of activity. Figures 6.2 to 6.7 plot the yearly trend of the different underpinnings of DMCs'. With regard to the components of managerial human capital, Figure 6.2. shows a steady trend of knowledge over the course of the companies' 10 first years of life. We appreciate how the lower limit is accentuated from year 4 to year 9. Regarding entrepreneurial capital (Figure 6.3.) and heterogeneity (Figure 6.4.), we appreciate a slightly declining trend from year 5 to year 9.

**Figure 6.2. Knowledge component of managerial human capital yearly trend**

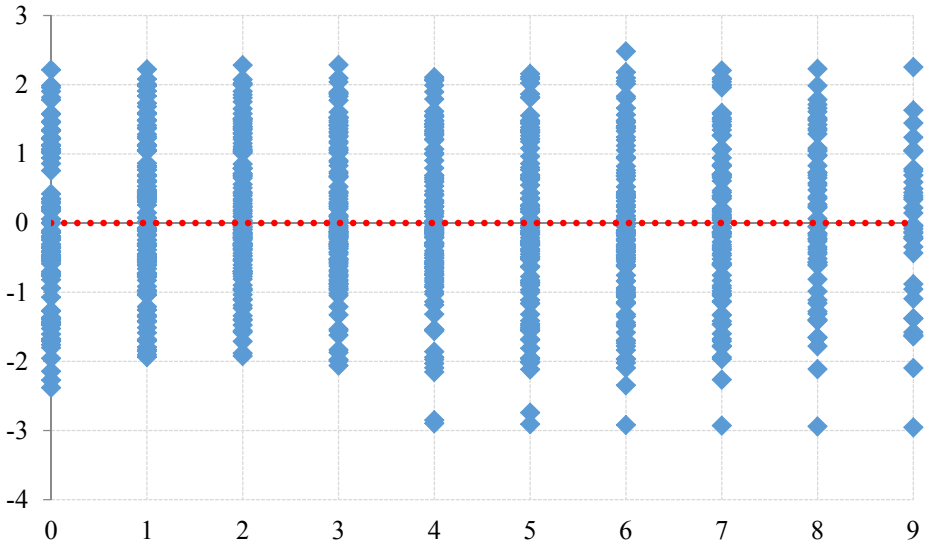



**Figure 6.3. Entrepreneurial component of managerial human capital yearly trend**

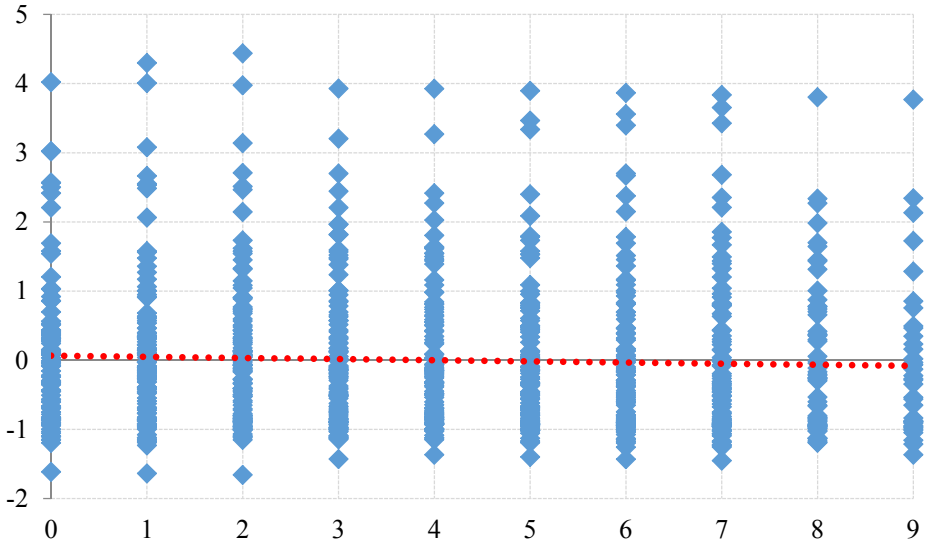
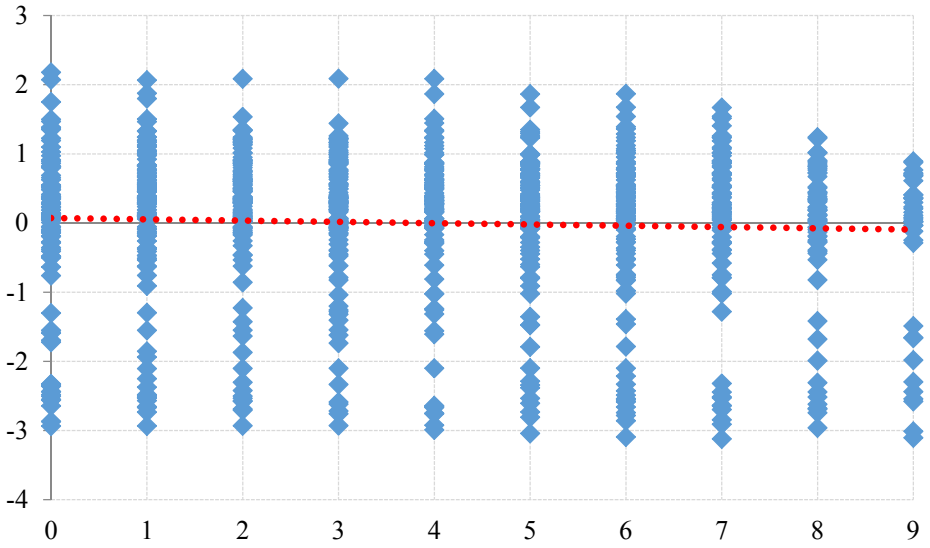


**Figure 6.4. Heterogeneity component of managerial human capital yearly trend**




In the case of the components of managerial social capital, we appreciate a remarkable increasing trend. Teams that remain united over time become more cohesive. This fact increases internal ties and links among the executives. Therefore, internal social capital grows over time. On the other hand, external social capital, that is to say directorships in other companies and external ties, shows a steady trend over time.

**Figure 6.5. Internal social capital yearly trend**

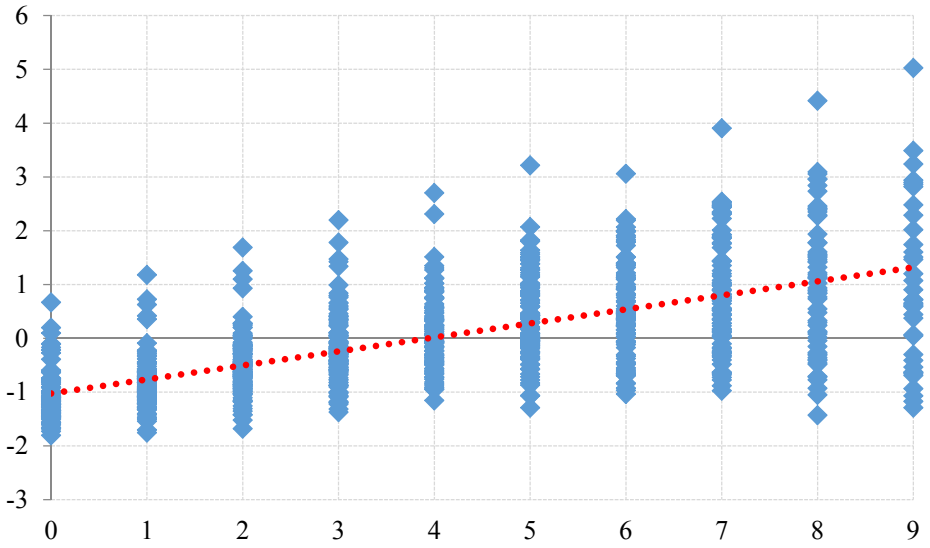
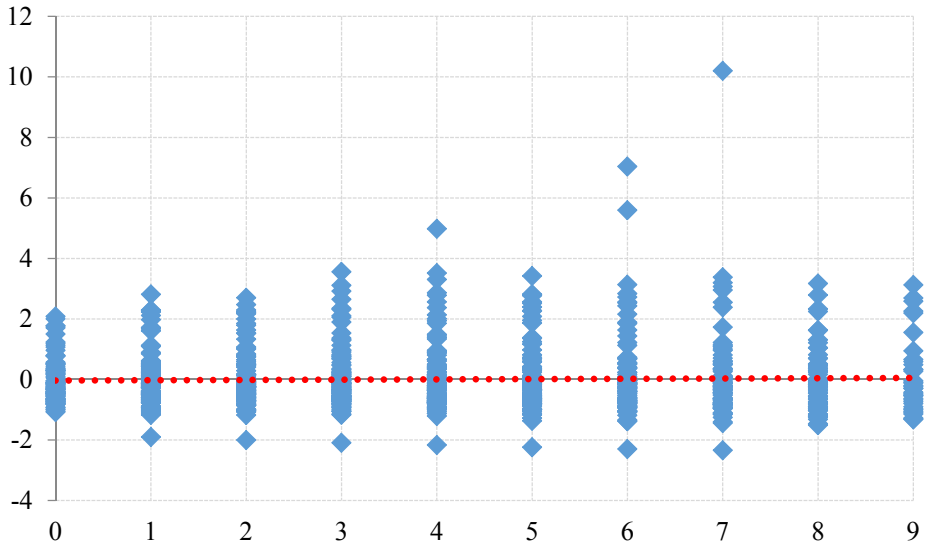


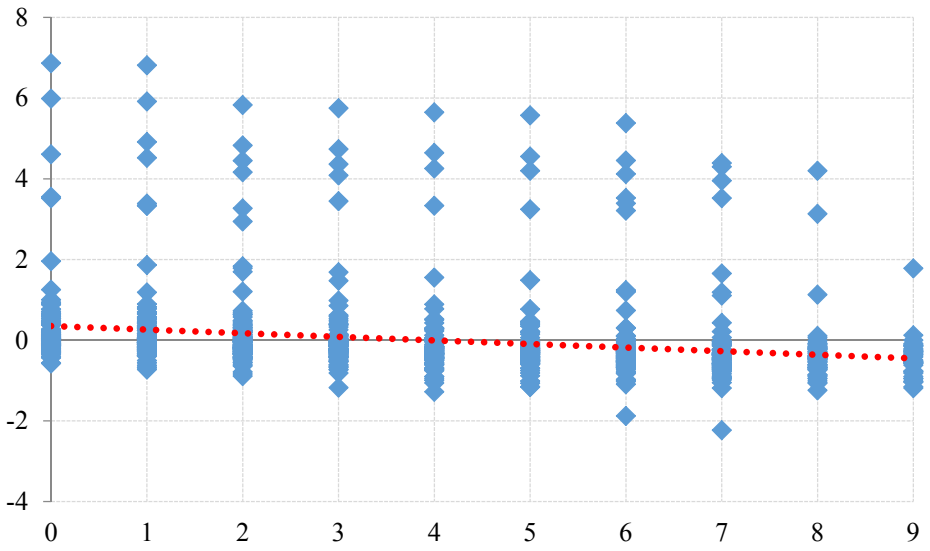

**Figure 6.6. External social capital yearly trend**




Managerial cognition exhibits a decreasing trend. We believe that during the first three to four years is when teams' prior shared experience is key for the correct functioning of the team. Previous co-working may positively affect mental models and quick reactions to environmental changes. However, as the venture evolves, the cohesion among the TMT's members at that moment, as indicated by their internal social capital seems to stands out from previous links. In fact, these two trends (managerial cognition and internal social capital) may be signaling how the venture is

launched based on the prior mental models of the founders and managers and how its dominant logic arises as it evolves (Prahalad and Bettis, 1986) through the cohesion of the team (internal social capital).

**Figure 6.7. Managerial cognition yearly trend**




These results show a different evolution of the various underpinnings of DMCs, which reveal the dynamics of NV teams. These teams become more cohesive as their members work together, increasing their internal social capital, while decreasing their entrepreneurial capital, as some founders leave the firm after the initial phase of creation and are replaced by managers with a more professional profile. It is interesting to signal the observed decreasing trend in the teams' shared cognition, as consequence of the renewal of the initial management teams that were composed individuals who had previously shared experiences. The plot of the evolution of DMCs reflects a process driven by changes within teams, which are oriented towards a less entrepreneurial profile and a greater cohesion and professionalism in management. The context itself, of ambitious entrepreneurial ventures that have decided to go to the public markets, can set this trend towards the consolidation and success of these companies that require certain capabilities and management teams.

In sum, measuring all three DMCs dimensions and exploring empirically the relationships between them as we do in this dissertation is important in order to not

incur in errors and misinterpretations in their assessment as the same experience of the management team may contribute simultaneously to the three attributes of DMCs.

The second research gap that this dissertation fills is to articulate the relationship between these three DMCs dimensions and organizational performance. Several studies have explored the separate effects of managerial human capital (e.g. Sirmon and Hitt, 2009); managerial social capital (e.g. Prashantham and Dhanaraj, 2010); managerial cognition (e.g. Zott and Huy, 2016); and even few have explored joint effects of two of these dimensions (e.g Davidsson and Honig, 2003; Kaplan, 2008), still no significant study to date includes measures of all three dimensions (Helfat and Martin, 2015). By incorporating all there DMCs' dimensions in our analysis we are able to asses which dimensions are more relevant for performance during the early stages of the venture evolution.

Our results show that when analyzed in combination two out of the three DMCs' dimensions have a positive impact on NVs performance: managerial social capital (internal and external) and managerial cognition. Managerial human capital and none of its three components (knowledge, entrepreneurial capital and heterogeneity) appear to have a significant direct effect on performance. Importantly, our results also signal that not all three DMCs' dimensions have the same importance for performance during the ventures' early years of activity. Managerial external capital results the most important dimension, followed by managerial cognition and ultimately managerial internal social capital. These findings are important because they show the multidimensional nature of DMCs' manifesting the relative relevance of some dimensions over others.

Finally, the third research gap that this dissertation fills is to understand how variations in the level of change experimented in the firm environment affect the role played by the three DMCs dimensions for NV performance. Our results show that managerial social capital (internal and external) and managerial cognition have a positive and significant effect on NV performance and the knowledge and entrepreneurial capital components of managerial human capital have no significant effect on NV performance regardless of degree of environmental velocity.

Interestingly, the heterogeneity of the managerial human capital has an effect on NV performance that is contingent to the degree of environmental velocity. Specifically, in high-velocity environments heterogeneous teams are associated with higher performance levels, whereas in low-velocity environments, homogenous teams achieve

higher performance. These findings are relevant because they begin to show that variations in the conditions of environmental change affect the role played by the three DMCs dimensions for NV performance.

## 6.3 Implications for practice

The results of our study can provide important advice for entrepreneurs and executives. The most central implication for NVs' executives to be taken from this research is that firms can improve their performance by working on their DMCs, that is, by paying close attention to the compositions of their management teams. This take away is not new in entrepreneurship research, yet we provide a more fine grained understanding of the required successful composition.

Venture founders and managers need to be aware that not all DMCs' dimensions have the same importance during the crucial early stages of the venture. In fact, a high level of knowledge and entrepreneurial capital are general requirements in innovative environments not offering increasing returns. Through this research we demonstrate that the most important managerial underpinnings for the first stages of NVs are managerial social capital and managerial cognition. Cohesive teams with a wide breadth of experience and tenure overlap generate positive synergies and strong internal ties, which implies more effective working relationships.

It is also important not to lose sight of the directorships that a TMT's members have in other companies. External ties help the company to obtain resources, which not only include financial resources but also information about new opportunities. In addition, prior shared experience among a TMT's members appears to compensate for the lack of an existing dominant logic during the NV's first years of activity. As the results show, prior shared experience declines over the years while internal social capital increases, crossing their trends around year 4 of the venture. This trend signals it takes a while to build the firm dominant logic and while it is not totally in place, the prior shared experience of the managers can act as a substitute for it.

Finally, with regard to environmental change, it is important to highlight the importance of the level of heterogeneity within the team human capital. As the velocity of the environment increases and a great number of new companies enter and leave the

industry, heterogeneous teams are able to detect environmental changes and orchestrate the strategic fit, whereas homogeneous teams lag behind.

### 6.4 Limitations and future avenues

Several limitations implicit in this research should be considered when interpreting the findings. First of all, we have analyzed a particular set of firms: NVs that go public soon after their register. Though NVs that intend and manage to go public soon after inception are managed by ambitious teams that exert a strong influence in the endeavors of the firm, the uniqueness of this set of NVs may create a bias in the composition of both the board and the TMT. For instance, the presence of a high proportion of insiders on a firm's board of directors offset the liability of founder management among IPO-stage firms (Certo, Covin, Daily, and Dalton, 2001). Although the context was specifically chosen to analyze a type of NV for which DMCs were relevant for the goals and ambitions of its founders and managers, it would be interesting to explore how DMCs are developed in those NVs that remain private.

Second, we focused on NVs that operate in knowledge intensive service industries. Services have a number of characteristics that make them not very visible to the consuming public (i.e. being intangibles not standardized; labor intensive; requiring high customer participation…); a fact that strengthen the important role that managers have to play in order to reduce the ambiguity around their services while trying to bring them to the market. As in the previous case, the service sector was expressly chosen by its growing importance and for the diversity of companies it contains, together with the small number of studies that have addressed this context. Still, future research should consider the comparison between manufacturing and service NVs, as the effects of founders and managers DMC' may be of different nature.

Third, we focus on a particular the alternative investment market: AIM from the London Stock Exchange Market. One of the main reasons was the quality of the information provided and its availability. Nonetheless, we believe that broadening the sample to include companies from other alternative markets would improve the representativeness of our findings. An important avenue for future research would be to study in combination the main alternative investment markets in Europe, such as MAB (Spain), NYSE Alternext (France, Belgium, Holland and Portugal), and Entry Standard (Germany).

Fourth, as a general rule we considered to be part of the TMT all the executives in the board section of annual reports. Despite prior researchers, such as Kor (2003), have followed this rule, we realize that we could be missing information about managers (executives) that were not serving on the board. We assessed the extent of that loss of information by checking the current size of TMTs through the companies' webpages and compared it with the size gathered through the annual reports finding that it was minimal. New studies should however include more members in the study of DMCs' as in entrepreneurial ventures there are a number of key individuals that although not holding formal managerial positions are heavily involved in strategic decisions (Klotz, Hmieleski, Bradley, and Busenitz, 2014).

Fifth, with regard to the underpinning of managerial cognition, we only used one component, prior shared experience, as a proxy for shared mental models (Zheng, 2012). Future research trying to enrich our framework for measuring DMCs should add other components, such as attention, perception and problem solving (Helfat and Peteraf, 2014), and analyze the letter to shareholders included in annual reports (Tripsas and Gavetti, 2000).

Finally, we would like to conclude with a statement of our research intent in the short term. We intend to classify our sample of NVs in function of their configuration of DMCs' components through a dynamic cluster analysis. Departing from that typology we would like to answer the following research questions associated with the potential existence of a path dependence effect in the evolution of dynamic capabilities (Winter, 2003): Does path dependence exist in the configuration of DMCs? Are all alternative paths as likely to happen? What type of changes would affect NVs' abilities to adapt/evolve to alternative DMCs evolutionary paths? Task environment effects? Strategic effects? Performance effects? Board composition effects?

# References

Adler P.S., & Kwon S. (2002). Social capital: Prospects for a new concept. Academy of Management Review, 27/1, 17-40.

Adner R., & Helfat C.E. (2003). Corporate effects and dynamic managerial capabilities. Strategic Management Journal, 24/10, 1011-1025.

Aldrich H. (1999). Organizations Evolving. Sage, Thousand Oaks, CA

Almus M., & Nerlinger E.A. (1999). Growth of new technology-based firms: which factors matter? Small Business Economics, 13/2, 141-154.

Amason A.C., Shrader R.C., & Tompson G.H. (2006). Newness and novelty: Relating top management team composition to new venture performance. Journal of Business Venturing, 21/1, 125-148.

Autio E., Sapienza H.J., & Almeida J.G. (2000). Effects of age at entry, knowledge intensity, and imitability on international growth. Academy of Management Journal, 43/5, 909-924.

Barkema H.G., & Shvyrkov O. (2007). Does top management team diversity promote or hamper foreign expansion? Strategic Management Journal, 28/7, 663-680.

Barney J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17/1, 99-120.

Barney J., Wright M., & Ketchen D.J. (2001). The resource-based view of the firm: Ten years after 1991. Journal of Management, 27/6, 625-641.

Baron R.A. (2006). Opportunity recognition as pattern recognition: How entrepreneurs "connect the dots" to identify new business opportunities. The Academy of Management Perspectives, 20/1, 104-119.

Baron R.A., & Tang J. (2009). Entrepreneurs' social competence and new venture performance: Evidence on potential mediators and cross-industry generality. Journal of Management, 35, 282-306.

Bates T. (1990). Entrepreneur human capital inputs and small business longevity<br>. The Review of Economics and Statistics, Vol. 72, No. 4, 551-559.

Baum J.R., & Bird B.J. (2010). The Successful Intelligence of High-Growth Entrepreneurs: Links to New Venture Growth. Organization Science, 21/2, 397-412.

Baum R.J., & Wally S. (2003). Strategic decision speed and firm performance. Strategic Management Journal, 24/11, 1107-1129.

Beck J.B., & Wiersema M.F. (2013). Executive decision making: Linking dynamic managerial capabilities to the resource portfolio and strategic outcomes. Journal of Leadership and Organizational Studies, 20/4, 408-419.

Becker G.S. (1993) Human Capital. Press: Chicago, IL: University of Chicago.

Beckman C.M. (2006). The influence of founding team company affiliations on firm behavior. Academy of Management Journal, 49/4, 741-758.

Bergen M., & Peteraf M.A. (2002). Competitor identification and competitor analysis: A broad-based managerial approach. Managerial and Decision Economics, 23/4,5, 157-169.

Birch D.G. (1979). The job generation process. MIT program on neighborhood and regional change. Cambridge, MA: MIT Press.

Birley S. (1987). New ventures and employment growth. Journal of Business Venturing, 2/2, 155-165.

Boeker W., & Wiltbank R. (2005). New Venture Evolution and Managerial Capabilities. Organization Science, 16/2, 123-133.

Boxman E.A., De Graaf P.M., & Flap H.D. (1991). The impact of social and human capital on the income attainment of Dutch managers. Social Networks, 13/1, 51-73.

Brinckmann J., & Hoegl M. (2011). Effects of initial teamwork capability and initial relational capability on the development of new technology□based firms. Strategic Entrepreneurship Journal, 5/1, 37-57.

Brixy U., Sternberg R., & Stüber H. (2012). The selectiveness of the entrepreneurial process. Journal of Small Business Management, 50/1, 105-131.

Bruderl J., Preisendorfer P., & Ziegler R. (1992). Survival Chances of Newly Founded Business Organizations. American Sociological Review, 57/2, 227-242.

Bruining H., & Wright M. (2002). Entrepreneurial orientation in management buy-outs and the contribution of venture capital. Venture Capital: An International Journal of Entrepreneurial Finance, 4/2, 147-168.

Burt R.S. (1997). The contingent value of social capital. Administrative Science Quarterly, 339-365.

Campbell B.A., Coff R., & Kryscynski D. (2012). Rethinking sustained competitive advantage from human capital. Academy of Management Review, 37/3, 376-395.

Carpenter M.A., & Fredrickson J.W. (2001). Top management teams, global strategic posture, and the moderating role of uncertainty. Academy of Management Journal, 44/3, 533-545.

Carpenter M.A., Geletkanycz M.A., & Sanders W.G. (2004). Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. Journal of Management, 30/6, 749-778.

Carroll G.R., & Harrison J.R. (1998). Organizational demography and culture: Insights from a formal model and simulation. Administrative Science Quarterly, 637-667.

Castanias R.P., & Helfat C.E. (1991). Managerial Resources and Rents. Journal of Management, 17/1, 155-171.

Castanias R.P., & Helfat C.E. (1991). Managerial Resources and Rents. Journal of Management, 17/1, 155-171.

Castanias R.P., & Helfat C.E. (2001). The managerial rents model: Theory and empirical analysis. Journal of Management, 27/6, 661-678.

Castrogiovanni G.J. (1991). Environmental munificence; a theoretical assessment. Academy of Management Review, 16/3, 542-565.

Certo T., Covin J.G., Daily C.M., & Dalton D.R. (2001). Wealth and the effects of founder management among IPO-stage new ventures. Strategic Management Journal, 22/6/7, 641-658.

Chahine S., Filatotchev I., & Zahra S.A. (2011). Building perceived quality of founder□ involved IPO firms: Founders' effects on board selection and stock market performance. Entrepreneurship Theory and Practice, 35/2, 319-335.

Chhaochharia V., & Grinstein Y. (2007). The changing structure of US corporate boards: 1997–2003. Corporate Governance: An International Review, 15/6, 1215-1223.

Child J. (1972). Organizational structure, environment and performance: the role of strategic choice. Sociology, 6/1, 1-22.

Cohen W.M., & Levinthal D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 128-152.

Colombo M.G., & Grilli L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. Research Policy, 34/6, 795-816.

Cooper A., Gimeno-Gascón F.J., & Woo C.Y. (1997). Initial human and financial capital as predictors of new venture performance. The Journal of Private Equity, 1/2, 13-30.

Cooper A.C., Folta T., Gimeno-Gascon J., & Woo C.Y. (1992). Entrepreneurs' exit decisions: The role of threshold expectations. Academy of Management Proceedings, 1992/1, 75-79.

Cooper A.C., Woo C.Y., & Dunkelberg W.C. (1989). Entrepreneurship and the initial size of firms. Journal of Business Venturing, 4/5, 317-332.

Davis J.P., Eisenhardt K.M., & Bingham C.B. (2009). Optimal structure, market dynamism, and the strategy of simple rules. Administrative Science Quarterly, 54/3, 413-452.

Delmar F., & Shane S. (2003). Does business planning facilitate the development of new ventures? Strategic Management Journal, 24/12, 1165-1185.

Delmar F., & Shane S. (2004). Legitimating first: Organizing activities and the survival of new ventures. Journal of Business Venturing, 19/3, 385-410.

Delmar F., & Shane S. (2006). Does experience matter? The effect of founding team experience on the survival and sales of newly founded ventures. Strategic Organization, 4/3, 215-247.

Dess G.G., & Beard D.W. (1984). Dimensions of organizational task environments. Administrative Science Quarterly, 52-73.

Dosi G., Nelson R., & Winter S. (2000) The nature and dynamics of organizational capabilities. OUP Oxford.

Eggers J.P., & Kaplan S. (2009). Cognition and Renewal: Comparing CEO and Organizational Effects on Incumbent Adaptation to Technical Change. Organization Science, 20/2, 461-477.

Eisenhardt K.M. (1989). Making fast strategic decisions in high-velocity environments. Academy of Management Journal, 32/3, 543-576.

Eisenhardt K.M., & Martin J.A. (2000). Dynamic capabilities: What are they? Strategic Management Journal, 21/1, 1105-1121.

Eisenhardt K.M., & Schoonhoven C.B. (1990). Organizational growth: Linking founding team, strategy, environment, and growth among US semiconductor ventures, 1978-1988. Administrative Science Quarterly, 504-529.

Ensley M.D., & Pearce C.L. (2001). Shared cognition in top management teams: implications for new venture performance. Journal of Organizational Behavior, 22/2, 145-160.

Finkelstein S., & Hambrick D.C. (1996) Strategic Leadership: Top Executives and Their Effects On Organizations (Hornbooks) Author: Sydney Finkelstein, Donald C. South-Western College Pub.

Finkelstein S., Hambrick D.C., & Cannella A.A. (2009) Strategic leadership: Theory and research on executives, top management teams, and boards. Oxford University Press.

Foo M., Sin H., & Yiong L. (2006). Effects of team inputs and intrateam processes on perceptions of team viability and member satisfaction in nascent ventures. Strategic Management Journal, 27/4, 389-399.

Forbes D.P. (2005). Managerial determinants of decision speed in new ventures. Strategic Management Journal, 26/4, 355-366.

Gavetti G., Levinthal D.A., & Rivkin J.W. (2005). Strategy making in novel and complex worlds: the power of analogy. Strategic Management Journal, 26/8, 691-712.

Geletkanycz M.A., & Hambrick D.C. (1997). The external ties of top executives: Implications for strategic choice and performance. Administrative Science Quarterly, 654-681.

Geletkanycz M.A., Boyd B.K., & Finkelstein S. (2001). The strategic value of CEO external directorate networks: Implications for CEO compensation. Strategic Management Journal, 22/9, 889-898.

Gimeno J., Folta T.B., Cooper A.C., & Woo C.Y. (1997). Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. Administrative Science Quarterly, 750-783.

Grant R.M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. California Management Review, 33/3, 114-135.

Grimm C.M., & Smith K.G. (1991). Management and Organizational Change: A Note on the Railroad Industry. Strategic Management Journal, 12/7, 557-562.

Gruber M., MacMillan I.C., & Thompson J.D. (2012). From minds to markets how human capital endowments shape market opportunity identification of technology start-ups. Journal of Management, 38/5, 1421-1449.

Haber S., & Reichel A. (2007). The cumulative nature of the entrepreneurial process: The contribution of human capital, planning and environment resources to small venture performance. Journal of Business Venturing, 22/1, 119-145.

Hambrick D.C., & Mason P.A. (1984). Upper Echelons: The organization as a reflection of its top managers. Academy of Management. The Academy of Management Review, 9/2, 193-206.

Hambrick D.C., Cho T.S., & Chen M.-. (1996). The influence of top management team heterogeneity on firms' competitive moves. IEEE Transactions on Engineering Management, 41/4. NDR, 659-684.

Harris D., & Helfat C. (1997). Specificity of CEO human capital and compensation. Strategic Management Journal, 18/11, 895-920.

Haynes K.T., & Hillman A. (2010). The effect of board capital and CEO power on strategic change. Strategic Management Journal, 31/11, 1145-1163.

Helfat C., Finkelstein S., Mitchell W., Peteraf M., Singh H., Teece D., & Winter S. (2007) Dynamic capabilities: understanding strategic change in organizations. Malden, Mass.; Oxford: Blackwell.

Helfat C.E., & Lieberman M.B. (2002). The birth of capabilities: Market entry and the importance of pre-history. Industrial and Corporate Change, 11/4, 725-760.

Helfat C.E., & Martin J.A. (2014). Dynamic Managerial Capabilities: Review and Assessment of Managerial Impact on Strategic Change. Journal of Management.

Helfat C.E., & Martin J.A. (2015). Dynamic Managerial Capabilities Review and Assessment of Managerial Impact on Strategic Change. Journal of Management, 41/5, 1281-1312.

Helfat C.E., & Peteraf M.A. (2014). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. Strategic Management Journal, 36/6, 831-850.

Hinkin T.R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. Organizational Research Methods, 1/1, 104-121.

Hirsch P.M. (1975). Organizational effectiveness and the institutional environment. Administrative Science Quarterly, 20/3, 327-344.

Hmieleski K.M., & Ensley M.D. (2007). A contextual examination of new venture performance: entrepreneur leadership behavior, top management team heterogeneity, and environmental dynamism. Journal of Organizational Behavior, 28/7, 865-889.

Huff A.S. (1990) Mapping strategic thought. John Wiley & Sons.

Johnson S.G., Schnatterly K., & Hill A.D. (2013). Board Composition Beyond Independence: Social Capital, Human Capital, and Demographics. Journal of Management, 39/1, 232-262.

Kaplan S., Murray F., & Henderson R. (2003). Discontinuities and senior management: Assessing the role of recognition in pharmaceutical firm response to biotechnology. Industrial and Corporate Change, 12/2, 203-233.

Kerlinger F.N. (1986) Foundations of Behavioral Research. New York: Holt, Rhinehart & Winston.

Klotz A.C., Hmieleski K.M., Bradley B.H., & Busenitz L.W. (2014). New Venture Teams: A Review of the Literature and Roadmap for Future Research. Journal of Management, 40/1, 226-255.

Kor Y.Y. (2003). Experience-Based Top Management Team Competence and Sustained Growth. Organization Science, 14/6, 707-719.

Kor Y.Y., & Mahoney J.T. (2005). How dynamics, management, and governance of resource deployments influence firm-level performance. Strategic Management Journal, 26/5, 489-496.

Kor Y.Y., & Mesko A. (2013). Dynamic managerial capabilities: configuration and orchestration of top executives' capabilities and the firm's dominant logic, 34/2, 233-244.

Kor Y.Y., & Misangyi V.F. (2008). Outside directors' industry-specific experience and firms' liability of newness. Strategic Management Journal, 29/12, 1345-1355.

Krackhardt D. (1990). Assessing the political landscape: Structure, cognition, and power in organizations. Administrative Science Quarterly, 342-369.

Laamanen T., & Wallin J. (2009). Cognitive dynamics of capability development paths. Journal of Management Studies, 46/6, 950-981.

Lastovicka J.L., & Thamodaran K. (1991). Common Factor Score Estimates in Multiple Regression Problems. Journal of Marketing Research, 28/1, 105-112.

Lee H., & Park J. (2008). The influence of top management team international exposure on international alliance formation. Journal of Management Studies, 45/5, 961-981.

Li D. (2013). Multilateral R&D alliances by new ventures. Journal of Business Venturing, 28/2, 241-260.

Li H., & Zhang Y. (2007). The role of managers' political networking and functional experience in new venture performance: Evidence from China's transition economy. Strategic Management Journal, 28/8, 791-804.

March J.G., & Olsen J.P. (1976) Ambiguity and choice in organizations. Ambiguity and choice in organizations, 2, 10-23.

Martin J.A. (2011). Dynamic managerial capabilities and the multibusiness team: the role of episodic teams in executive leadership groups. Organization Science, 22/1, 118-140.

McDougall P.P., Robinson R.B.,Jr, & DeNisi A.S. (1992). Modeling new venture performance: an analysis of new venture strategy, industry structure, and venture origin. Journal of Business Venturing, 7/4, 267-289.

McGee J.E., Dowling M.J., & Megginson W.L. (1995). Cooperative strategy and new venture performance: The role of business strategy and management experience. Strategic Management Journal, 16/7, 565-580.

McKelvie A., & Davidsson P. (2009). From resource base to dynamic capabilities: an investigation of new firms. British Journal of Management, 20 / Issue Supplement S1, S80.

Mitchell R.K., Busenitz L., Lant T., McDougall P.P., Morse E.A., & Smith J.B. (2002). Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship research. Entrepreneurship Theory and Practice, 27/2, 93-104.

Mudambi R., & Zahra S.A. (2007). The survival of international new ventures. Journal of International Business Studies, 38/2, 333-352.

Nadkarni S., & Barr P.S. (2008). Environmental context, managerial cognition, and strategic action: an integrated view. Strategic Management Journal, 29/13, 1395-1427.

Nadkarni S., & Narayanan V.K. (2007). Strategic schemas, strategic flexibility, and firm performance: the moderating role of industry clockspeed. Strategic Management Journal, 28/3, 243-270.

Nahapiet J., & Ghoshal S. (1997). Social capital, intellectual capital and the creation of value firms. Academy of Management Best Paper Proceedings, 1997/1, 35-39.

Nelson R.R., & Winter S.G. (1982) An evolutionary theory of economic change. Cambridge Massachusetts: Belknap Press of Harvard University Press.

Nelson T. (2003). The persistence of founder influence: Management, ownership, and performance effects at initial public offering. Strategic Management Journal, 24/8, 707-724.

Nielsen K. (2015). Human capital and new venture performance: the industry choice and performance of academic entrepreneurs. The Journal of Technology Transfer, 40/3, 453-474.

O'Reilly C.A., Caldwell D.F., & Barnett W.P. (1989). Work group demography, social integration, and turnover. Administrative Science Quarterly, 21-37.

Ozgen E., & Baron R.A. (2007). Social sources of information in opportunity recognition: Effects of mentors, industry networks, and professional forums. Journal of Business Venturing, 22/2, 174-192.

Penrose E.T. (1959). The theory of the growth of the firm. Oxford: Oxford University Press.

Peteraf M., & Reed R. (2007). Managerial discretion and internal alignment under regulatory constraints and change. Strategic Management Journal, 28/11, 1089-1112.

Pfeffer J., & Salancik G.R. (2003) The external control of organizations: A resource dependence perspective. Stanford University Press.

Pisano G.P. (1994). Knowledge, integration, and the locus of learning: An empirical analysis of process development. Strategic Management Journal, 15/S1, 85-100.

Prahalad C.K., & Bettis R.A. (1986). The dominant logic: A new linkage between diversity and performance. Strategic Management Journal, 7/6, 485-501.

Prashantham S., & Dhanaraj C. (2010). The dynamic influence of social capital on the international growth of new ventures. Journal of Management Studies, 47/6, 967-994.

Prashantham S., Dhanaraj C., & Kumar K. (2015). Ties that bind: Ethnic ties and new venture internationalization. Long Range Planning, 48/5, 317-333.

Quigley T.J., & Hambrick D.C. (2012). When the former CEO stays on as board chair: effects on successor discretion, strategic change, and performance. Strategic Management Journal, 33/7, 834-859.

Rechner P.L., & Dalton D.R. (1991). CEO duality and organizational performance: a longitudinal analysis. Strategic Management Journal, 12/2, 155-160.

Reuber A.R., & Fischer E. (1997). The influence of the management team's international experience on the internationalization behaviors of SMEs. Journal of International Business Studies, 807-825.

Reynolds P.D., Bygrave W.D., Autio E., Cox L.W., & Hay M. (2002). Global entrepreneurship monitor. GEM, Babson College and Ewing Marion Kaufmann Foundation, Wellesley, MA and Kansas City, MO.

Roodman D. (2006). How to Do xtabond2. North American Stata Users' Group Meetings 2006, 8, Stata Users Group.

Rosenbloom R.S. (2000). Leadership, capabilities, and technological change: The transformation of NCR in the electronic era. Strategic Management Journal, 21/10-11, 1083-1103.

Salvato C. (2009). Capabilities unveiled: The role of ordinary activities in the evolution of product development processes. Organization Science, 20/2, 384-409.

Schoonhoven C.B., Eisenhardt K.M., & Lyman K. (1990). Speeding products to market: Waiting time to first product introduction in new firms. Administrative Science Quarterly, 177-207.

Shane S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. Organization Science, 11/4, 448-469.

Shane S., & Venkataraman S. (2000). The promise of entrepreneurship as a field of research. Academy of Management Review, 25/1, 217-226.

Shrader R., & Siegel D.S. (2007). Assessing the Relationship between Human Capital and Firm Performance: Evidence from Technology-Based New Ventures. Entrepreneurship Theory and Practice, 31/6, 893-908.

Siciliano J.I. (1996). The relationship of board member diversity to organizational performance. Journal of Business Ethics, 15/12, 1313-1320.

Siegel R., Siegel E., & Macmillan I.C. (1993). Characteristics distinguishing high-growth ventures. Journal of Business Venturing, 8/2, 169-180.

Sirmon D.G., & Hitt M.A. (2009). Contingencies within dynamic managerial capabilities: interdependent effects of resource investment and deployment on firm performance. Strategic Management Journal, 30/13, 1375-1394.

Skilling T.A., Harris G.T., Rice M.E., & Quinsey V.L. (2002). Identifying persistently antisocial offenders using the Hare Psychopathy Checklist and DSM antisocial personality disorder criteria. Psychological Assessment, 14/1, 27-38.

Smith E.E., & Kosslyn S.M. (2013) Cognitive Psychology: Pearson New International Edition: Mind and Brain. Pearson Higher Ed.

Starbuck W.H. (1973) Organization and their environments. International Inst. of Management, Science Center.

Stinchcombe A.L. (1963). Institutions of privacy in the determination of police administrative practice. American Journal of Sociology, 150-160.

Stuart R.W., & Abetti P.A. (1990). Impact of entrepreneurial and management experience on early performance. Journal of Business Venturing, 5/3, 151-162.

Teece D.J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal, 28/13, 1319-1350.

Teece D.J. (2012). Dynamic Capabilities: Routines versus Entrepreneurial Action. Journal of Management Studies, 49/8, 1395-1401.

Teece D.J., Pisano G., & Shuen A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18/7, 509-533.

Thomas A.S., Litschert R.J., & Ramaswamy K. (1991). The Performance Impact of Strategy-Manager Coalignment: An Empirical Examination. Strategic Management Journal, 12/7, 509-522.

Tian J.J., Haleblian J.J., & Rajagopalan N. (2011). The effects of board human and social capital on investor reactions to new CEO selection. Strategic Management Journal, 32/7, 731-747.

Tihanyi L., Ellstrand A.E., Daily C.M., & Dalton D.R. (2000). Composition of the top management team and firm international diversification. Journal of Management, 26/6, 1157-1177.

Townsend D.M., & Busenitz L.W. (2014). Turning water into wine? Exploring the role of dynamic capabilities in early-stage capitalization processes. Journal of Business Venturing, 30/2, 292-306.

Tripsas M., & Gavetti G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. Strategic Management Journal, 21/10-11, 1147-1161.

Tsai W., & Ghoshal S. (1998). Social capital and value creation: The role of intrafirm networks. Academy of Management Journal, 41/4, 464-476.

Ucbasaran D., Westhead P., & Wright M. (2008). Opportunity Identification and Pursuit: Does an Entrepreneur's Human Capital Matter? Small Business Economics, 30/2, 153-173.

Van de Ven, Andrew H, Hudson R., & Schroeder D.M. (1984). Designing new business startups: Entrepreneurial, organizational, and ecological considerations, 10/1, 87-108.

Venkatraman N. (1989). Strategic orientation of business enterprises: The construct, dimensionality, and measurement. Management Science, 35/8, 942-962.

Vissa B., & Chacar A.S. (2009). Leveraging ties: the contingent value of entrepreneurial teams' external advice networks on Indian software venture performance. Strategic Management Journal, 30/11, 1179-1191.

Vissa B., & Chacar A.S. (2009). Leveraging ties: the contingent value of entrepreneurial teams' external advice networks on Indian software venture performance. Strategic Management Journal, 30/11, 1179-1191.

Walsh J.P. (1995). Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane. Organization Science, 6/3, 280-321.

Westphal J.D., & Bednar M.K. (2005). Pluralistic Ignorance in Corporate Boards and Firms' Strategic Persistence in Response to Low Firm Performance. Administrative Science Quarterly, 50/2, 262-298.

Williams K.Y., & O'Reilly C.A. (1998). Demography and diversity in organizations: A review of 40 years of research. Research in Organizational Behavior, 20, 77-140.

Wincent J., Anokhin S., & Örtqvist D. (2010). Does network board capital matter? A study of innovative performance in strategic SME networks. Journal of Business Research, 63/3, 265-275.

Winter S.G. (2000). The satisficing principle in capability learning. Strategic Management Journal, 21/10-11, 981-996.

Winter S.G. (2003). Understanding dynamic capabilities. Strategic Management Journal, 24/10, 991-995.

Winter S.G. (2012). Capabilities: their origins and ancestry. Journal of Management Studies, 49/8, 1402-1406.

Wright M., Thompson S., & Robbie K. (1992). Venture capital and management-led, leveraged buy-outs: A European perspective. Journal of Business Venturing, 7/1, 47-71.

Wright P.M., Coff R., & Moliterno T.P. (2014). Strategic Human Capital Crossing the Great Divide. Journal of Management, 40/2, 353-370.

Zahra S.A. (1996). Technology strategy and new venture performance: A study of corporate-sponsored and independent biotechnology ventures. Journal of Business Venturing, 11/4, 289-321.

Zahra S.A., & Wright M. (2015). Understanding the social role of entrepreneurship. Journal of Management Studies, In press.

Zahra S.A., Sapienza H.J., & Davidsson P. (2006). Entrepreneurship and dynamic capabilities: a review, model and research agenda. Journal of Management Studies, 43/4, 917-955.

Zajac E.J., Kraatz M.S., & Bresser R.K.F. (2000). Modeling the dynamics of strategic fit: A normative approach to strategic change. Strategic Management Journal, 21/4, 429-453.

Zheng Y. (2012). Unlocking founding team prior shared experience: A transactive memory system perspective. Journal of Business Venturing, 27/5, 577-591.

Zolin R., Kuckertz A., & Kautonen T. (2011). Human resource flexibility and strong ties in entrepreneurial teams. Journal of Business Research, 64/10, 1097-1103.